OCTOBER 1955

plating

JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

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SPEE-D-BURR FOR FINE FINISHING OF STEEL

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Use ENTHONE Emulsion Cleaner 75

DIP . . . . steel parts to be cleaned in Emulsion Cleaner 75 for only ***15 seconds.*** This simple immersion is done at room temperature (no heating facilities required) and with no irritation of the operator's nose, throat or skin.

RINSE . . in plain water.

DONE . . . and done ***thoroughly*** . . . in seconds! All heavy oil films and solid dirt have been removed from every corner and crevice . . . from slots, tapped holes and sculptured patterns.

INSURE . smooth, bright, adherent electrodeposits.

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MEET "LITTLE STEVE," A NEW, SPACE SAVING, LOW COST AUTOMATIC PLATING AND IMMERSION PROCESSING MACHINE

Here's What "Little Steve" Can Do

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- ANODIZING
- BLACK JAPANNING
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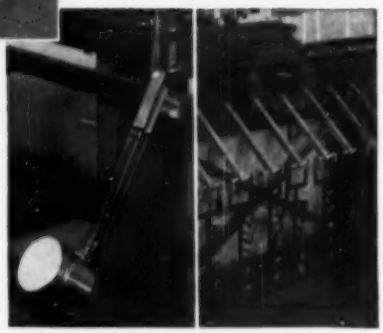
UP TO 40,000 PIECES PER DAY
540 RACKS PER HOUR

Yes, this new immersion processing machine by Stevens can process up to 40,000 pieces per day – and it has a variety of other uses too.

Ruggedly built "LITTLE STEVE," the hit of the 4th Industrial Finishing Exposition, can be obtained at a surprisingly low initial cost. It is ideal for large or small companies for it will fit many production cycles. It uses an arm as a rack or will take racks for small parts.

Being of small size it offers no floor space or load problems; involves low solution expense and means a small capital investment. It can be used easily as a laboratory testing machine.

For further information about "LITTLE STEVE" write for illustrated folder or call your local Stevens sales engineer.



A single part can be placed on each carrier arm as shown in the illustration above or racks of numerous parts can be used.

If a larger production model is desired the "Sgt. Steve" unit, using the same basic design, will provide the answer.

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An Educational Society for the Advancement of the Science of Electroplating, the Finishing of Metals and Allied Arts

plating

Journal of the American Electroplaters' Society

October 1955 **Vol. 42, No. 10**

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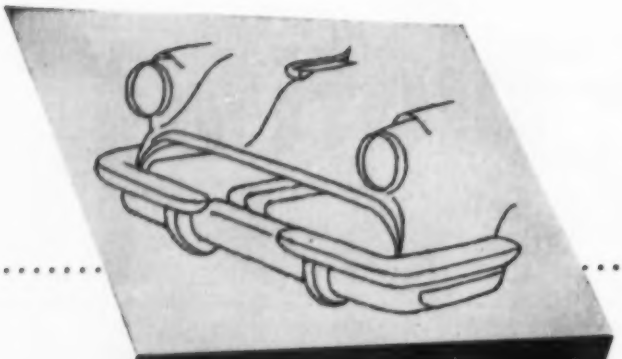

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cadmium plating

. . . ball and cast cadmium anodes . . . cadmium oxide . . . sodium cyanide . . . cadmium fluoborate.

tin plating

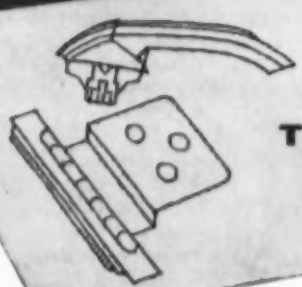
. . . cast tin anodes . . . sodium stannate . . . stannous sulfate . . . tin fluoborate . . . acid tin addition agent.

zinc plating

. . . ball and cast zinc anodes . . . sodium and zinc cyanide . . . zinc sulfate . . . zinc fluoborate.

lead plating

. . . cast lead anodes . . . lead fluoborate.



silver plating

. . . silver cyanide.

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Editorial

THE ANATOMY OF PLATING

"Man cannot live by bread alone"—Neither can the plated product! More than one ingredient is necessary to health, happiness and success. For instance, most of the people who use plated products know only what they see. If it looks good it is acceptable.

But you and I know differently. Man needs other than bread for food. He needs vitamins, proteins, minerals and other things found in many meats and vegetables. He also needs family and friends, work and play, interest and participation, and if he's a Plater, activity in AES!

So plated products need good preparation: buffing and cleaning, pickling and neutralizing, flash coats and under coats, also all the other applications of our Science and Art.

Only you and I know what is put into the plated product. We are responsible for its good looks, its good health and its long life. We are responsible for maintaining the level of quality first, then for lowering the cost consistent with quality, for producing the quantity consistent with quality. We are responsible for its containing growth and stature through company sponsored and AES sponsored research.

Let us guard carefully the diet of life-giving ingredients making up the anatomy of the plated products we sell.

Francis T. Eddy

SECOND VICE-PRESIDENT, AES

Worth crowing about . . .

for ELECTROLYTIC CLEANING of STEEL and COPPER

New Improved AHCOLOID "200"

Non-dusting, low foaming, *improved* Ahcoloid 200 is safer and easier to use than conventional heavy duty cleaners. Special Ahcoloid agents control escape of gases generated during anodic or reverse current cleaning. There is never a spray or overflow of caustic solution.

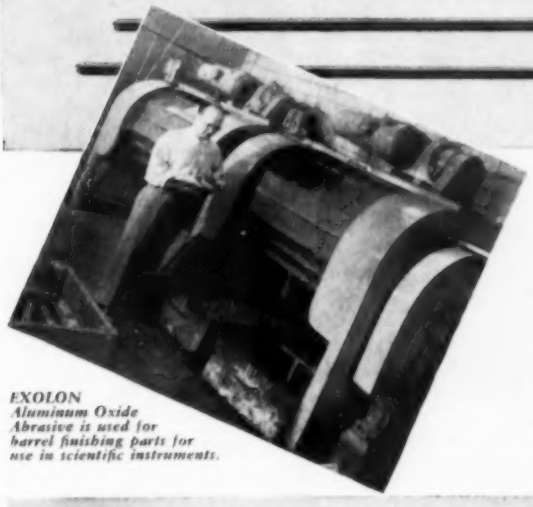
New, improved Ahcoloid 200 is a free-flowing alkaline powder that quickly and thoroughly frees steel or copper surfaces from grease, oil, metal particles, carbon deposits, or residue from such operations as buffing, stamping, or grinding.

It will pay you to find out more about *new, improved* Ahcoloid 200, the heavy duty cleaner with extra penetrating, wetting, and emulsifying power.

For full details about *new, improved* Ahcoloid 200, write today to Apothecaries Hall Company, 22 Benedict Street, Waterbury, Connecticut

Apothecaries Hall Co.

NOW... Finish Precision Parts with EXOLON Tumbling Abrasives



EXOLON Aluminum Oxide Abrasive is used for barrel finishing parts for use in scientific instruments.

EXOLON Tumbling Abrasive is carefully graded in sizes from 2½ inches down to fine powders.

Savings over old Hand Finishing Methods—50 to 80 Percent

Today, scientific research has developed equipment and abrasives for better barrel finishing techniques. Such an abrasive is EXOLON, an electrically fused aluminum oxide, chemically inert, resistant to fracture and extremely hard. EXOLON is pretumbled. Pretumbling produces rugged shapes that stand up longer in operation, since the sharp protuberances that break off easily have been eliminated. Results are always the same — batch after batch, when operated in formulated finishing cycles. EXOLON insures dependable results and economical finishing.

Precision parts shown above were barrel finished with EXOLON to a predetermined stock removal and surface finish. Whether your parts are castings, stampings or machined parts, there is an EXOLON abrasive to meet your finishing needs. An EXOLON representative is available to help you with your barrel finishing problems.

Write for folder and recommendations!

THE EXOLON COMPANY

973 EAST NIAGARA STREET — TONAWANDA, N.Y.

Manufacturers of SILICON CARBIDE and ALUMINUM OXIDE ABRASIVES

Industry News

Leon K. Lindahl in the act of breaking ground for the new Factory Building to be located on Hoover Road, just north of the Eight Mile Road in northeast Detroit. With Lindahl, is C. H. Reeme, President of the Udylite Corporation on his right, and L. V. Nagle, Executive Vice President of the Udylite Corporation on his left. Also in the picture is W. J. Cluff, President of F. B. Stevens, Inc., the wholly owned subsidiary of the Udylite Corporation. Also pictured are O'Dell of O'Dell, Hewlett and Luckenbach, the architects, and Arnold Malow, President of Barton-Malow Company, the contractor

"A laboratory with factory-size equipment" is the way General Electric research scientists describe the new Metals and Ceramics Building dedicated August 26 at the GE Research Laboratory. Since the new building is not a "production" facility, the equipment is always available for experimental work by scientists, who will thus be able to speed the transition of research discoveries from the laboratory to practical applications for industry and defense. GE has invested $5 million in the new facility, described as the world's most complete metals and ceramics processing laboratory

GE Lab Dedication—A research facility destined to provide new materials for the future—for applications ranging from faster rockets and atomic power plants to labor-saving kitchen equipment—was dedicated at the General Electric Research Laboratory. Principal speaker at the ceremonies was Donald A. Quarles, newly-nominated by President Eisenhower to serve as Secretary of the Air Force.

"The week's activities," according to Dr. C. G. Suits, GE vice president and director of research, "have been planned to demonstrate the growing significance of metallurgy and ceramics as sciences, to emphasize the importance of metallurgy and ceramics to the nation's industry and defense, and to bring attention to the vital role this new building will have in the General Electric Company's future."

Dr. Suits pointed out that completion of the Metals and Ceramics Building is part of the $13 million expansion program for the Research Laboratory at The Knolls announced last year. At that time GE President Ralph J. Cordiner reasserted that Schenectady will become "the industrial research center of the world."

New Building for Udylite—Leon K. Lindahl, Chairman of the Board of Directors of the Udylite Corporation, announces an expansion and new building program.

The Factory Building will have a manufacturing area of 160,000 square feet with a factory office area of 8,000 square feet. One third of the manufacturing area, approximately 50,000 square feet, is provided with 30 feet head room to take care of the increasing height of Udylite built equipment. The building will be constructed of a steel frame of columns, trusses and beams with the exterior walls of masonry, sash and aluminum corrugated panels. The building will be served with a railroad siding with two spurs into the building through rolling steel curtain doors. Both receiving and shipping operations can be handled by rail. Motor freight can be received and dispatched from a six position truck well completely enclosed and protected by rolling steel curtain doors. Adequate parking facilities are provided immediately for 250 cars with a plan for future parking of 500 additional cars.

Udylite has also a new New York office and warehouse in the process of construction. The new warehouse will double the present capacity and provide the much needed additional office space. The building will include new customer service laboratories and new show room. In addition to the two loading docks, the New York warehouse will have a pick up dock for customer convenience. The new location is in Long Island City, about a mile and a half from the present location.

The Chicago office also has a new warehouse and office under construction. The new location will give the Chicago district more than twice the present floor space. It also will have improved offices and customer service laboratories. The new location is in west side Chicago.

It is expected that these constructions will be completed and that the new buildings will be occupied by Udylite personnel and facilities by January 1, 1956.

Spanish Edition

An agreement signed by the Instituto Electroquimico, S.A., 56 Corcega, Barcelona, and the Joseph B. Kushner Electroplating School, 115 Broad Street, Stroudsburg, Pa., made available to the Spanish electroplating industry, a Spanish version of Electroplating Know How, the home study course in modern electroplating. A translation of the course is now in preparation and will be available within the next few months. The Spanish course will be given under the supervision of Professor M. Terol, well known Spanish electrochemist and metallurgist. The scholastic records of the Spanish students will be kept both in the U. S. and in Spain and diplomas will be awarded as in the United States to Spanish students completing the course.

Cut costly buffing— get better results with "PR" plating

The piece at the left was plated by the usual cyanide process and buffed. The piece on the right was "PR"—Periodic Reverse—plated but was not buffed. Result: Much of the cost was saved and the "PR" plated piece had far superior leveling!

You too can eliminate or greatly reduce expensive prefinishing and get superior leveling like this by using "PR"—Periodic Reverse—plating and Westinghouse Wes-X® compounds. The electrical "back-stroke" feature of "PR" plating continuously refines the grain structure. "PR" plating eliminates nodules, does away with build-up of metal at corners and sharp points, and covers such defects as die marks and scratches.

"PR" plating is a patented Westinghouse process. It is available to you through your local Westinghouse sales engineer. Let him make a free survey of your plant. Call your nearest Westinghouse sales office or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-10445-A

YOU CAN BE SURE...IF IT'S

Westinghouse

BUFFED

INDICATE A 1006.

"PR" PLATING

Industry News

At the award presentation are: J. F. Carland, Executive Vice-President and General Manager of Chandeysson; F. E. Lind, Engineering Supervisor for the insurance company giving the award; T. A. Leonhardt, Plant Superintendent of Chandeysson Electric Company receiving the award; and E. M. Howie, Casualty Manager, Howie Insurance Company

Terrific Safety Record.—Chandeysson Electric Co. achieved the remarkable number of 371,751 man-hours of work with no lost-time accident. A plaque citing the company and its employees for their outstanding record was presented to the company by officials of the safety-insurance underwriter, the American Automobile Insurance Co.

DeVilbiss School. I. B. Thomas has devoted a part of the curriculum of the spray painting class to the catalyst spray gun which already is having a revolutionary effect in the finishing field. Class work is composed of both theory and actual practice.

The spray painting course begins in the classroom where the tool (spray gun) is thoroughly explained. The theory sessions extend to the other equipment which a spray operator will use. Every item constituting a complete spray painting outfit is thoroughly covered. Air pressures, material viscosities, film thicknesses and all of the ramifications of painting are discussed. The pupils also are taught to assemble and disassemble equipment.

Part of a recent class listens to Instructor I. B. Thomas giving Susie Walters pointers on the applications of multicolor paint with a spray gun at the Spray Paint Classes at the DeVilbiss Co., Toledo, Ohio

After the classroom work, the group is taken into the laboratory where everyone is given an opportunity to prepare materials and spray them. Each student is taught the use of the gun. The classroom theory is put into actual practice so that students can see for themselves the results which correct techniques produce.

Enrollment in the school is free, the only cost to the student being his board and room.

The three full courses of instruction in industrial spray finishing for the remainder of 1955 at the DeVilbiss Company School of Spray Finishing in Toledo are: October 3; November 7; December 5.

H. C. McClellan is Elected to APF Board of Trustees. H. C. McClellan, president of the Old Colony Paint and Chemical Company and chairman of the board of the National Association of Manufacturers, was elected to the Board of Trustees of the Air Pollution Foundation, the independent, scientific research organization with headquarters in Los Angeles.

McClellan, who founded the Old Colony Company in 1927, was president of the National Association of Manufacturers last year. He is a member of the board of the Los Angeles Chamber of Commerce, and chairman of the board at Occidental College. He has just returned from a six-week mission to Chile for the Foreign Operations Administration, exchanging ideas with businessmen and industrialists in Chile.

As a Foundation trustee, McClellan will serve on a 35-member board, representing a cross section of the fields of industry, commerce, business, education and science.

The Foundation began operations last year, conducting scientific research into the causes of air pollution. Projects are carried out in top ranking laboratories from coast to coast.

ROTO FINISH
your new opportunity in
controlled precision finishing
Roto-Finish processes are controlled precision finishing operations using low cost mass production techniques, which maintain exact tolerances on most any size or shape precision part with no significant dimensional changes. Roto-Finish speeds production, cuts maintenance expense, minimizes operational costs, yet produces top quality finishing results. Roto-Finish offers latest in controlled methods, materials and special purpose fixture equipment. Roto-Finish is your new opportunity in controlled precision finishing with guaranteed results!
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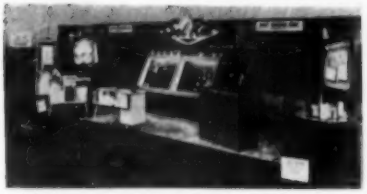


The growing importance of precious metal plated ornaments on consumer products and the application of precious metal industrial finishes was stressed at the recent Industrial Finishing Exposition in Cleveland, by Sel-Rex Precious Metals, Inc., Belleville, N. J. Items displayed in the illuminated cases contain an application of Sel-Rex Bright Gold, Bright Rhodium, or Silverex. Among the items that created great interest was the saxophone plated with Sel-Rex Bright Gold. Items of new equipment shown at the booth, shared by Bart-Messing Corporation and Sel-Rex Precious Metals, Inc., included Double Duty Filters, Jet Plater, Centrifugal Pump, and the water-cooled Germanium Rectifier.

Shortcut to Enameling—The 40-year search by porcelain enamelers for a process that would eliminate the costly and time-consuming ground coat phase of porcelain enameling appears to be over.

A new material, developed by Parker Rust Proof Company, is the key to a new method which allows the application of the porcelain enamel finish coat directly to ferrous metals, according to M. B. Roosa, Vice President in charge of Sales.

After original development and testing in the Parker laboratories in Detroit, the new material, called Parker Pre-Namel 410, was ready for field testing in a production plant. This has been carried on for the past two years with the cooperation of Frigidaire Division of General Motors in their Dayton plant. Also collaborating in the field development has been Pemco Corporation, Baltimore, Md., a leading manufacturer of frit.

The new method has demonstrated that it delivers improved physical characteristics of the finished product, with important reduction in costs through by-passing the conventional ground cost and nickel flash steps.

In exhaustive tests the special metal treatment provided by the Pre-Namel 410 process has produced (1) reduction of coating thickness with consequent reduction of damage from torsion and cross-bending (2) straighter parts with less bowing between front and back sides (3) an indication of fewer rejects and (4) a reduction of the number and types of enamel frits required.

Tests conducted by Parker, in cooperation with Frigidaire and Pemco indicate that the process eliminates the need for a special premium base metal; applies successfully to cold rimmed steel and enameling iron; permits application of standard finish coat porcelain enamels direct to steel; produces completed parts meeting the best acceptance tests for standard porcelain enamel.

Allied Porcenell Appoints Heintz Manufacturing Co. William Stoll, President of Allied Porcenell, Inc., Waukegan, Ill., sales representatives for Porcenell inorganic silicate coatings, has announced the appointment of the Heintz Manufacturing Company, Philadelphia, as eastern manufacturing licensee for their new line of low-fire protective coatings and sealers.

The Heintz Company operates eight divisions producing contract metal work for automotive, aircraft and railroad customers. They will produce and assist in the sale of Porcenell through their Porcelain Enamel Division. In a meeting of the two companies in Philadelphia J. M. Ward, Heintz Vice President, expressed his interest in producing Porcenell to meet a need for adequate low cost protection for thin gauge ferrous metals as used in industry.

A development of Vitreco, Inc., Waukegan, Ill., Porcenell is currently being used as a protective decorative coating for such applications as refrigeration components, structural panels and corrugated building materials, chalk boards, marine horns and lighting fixtures; high voltage electrical furniture and fixtures, air conditioning components, etc.

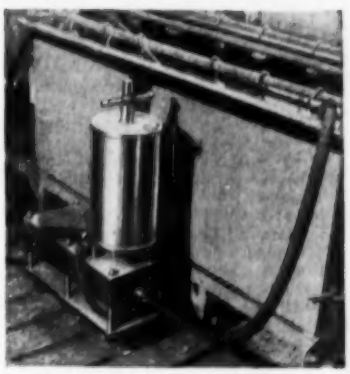
To aid in the distribution, Allied Porcenell has appointed Walter A. Gorrel, Henry Atwater and D. S. Hoffman as its representatives in the East. With their respective organizations, Hoffman will handle the railroad industry, Atwater the architectural aspects and Gorrel the general industrial applications.

LOOK

No Rejects

NO pitting, spotting, or reworking . . . . . .

Impurities—primary cause of pitting, spotting, rejected finished work—are positively eliminated by the Alsop "Sealed-Disc" Filter. That's because they're designed for Platers—to meet plating room requirements. That's why they're compact, portable—smaller than conventional filters—save valuable space—yet capable of handling equal volumes of solutions.
Simplicity of design cuts operating time and labor—means savings for you. Check its many additional proved performance features and know why more platers depend on "Sealed-Disc" Filters. Ask your regular plating supplier—or write for details.



"Sealed-Disc" Filters remove more impurities with less effort and in less time. Use it on your acid dips, electro cleaners, and solvents too.

ALSOP ENGINEERING CORPORATION
Positive Filtration
FIRST STEP IN CUTTING COSTS
1010 FINE STREET • MILLDALE, CONNECTICUT

Available for Immediate Shipment, Attractive Values

THE FOLLOWING EXCELLENT REBUILT AND GUARANTEED ELECTROPLATING MOTOR GENERATOR SETS AND RECTIFIERS, WITH FULL CONTROL EQUIPMENT:

PLATERS

1—7500/3750 AMPERE, 9/18 VOLT, **HANSON-VAN WINKLE-MUNNING**, Synchronous.
1—6000/3000 AMPERE, 6/12 VOLT, **CHANDEYSSON**, Synchronous, Exciter-in-head.
1—5000/2500 AMPERE, 6/12 VOLT, **CHANDEYSSON**, Synchronous, Exciter-in-head.
1—4000/2000 AMPERE, 6/12 VOLT, **CHANDEYSSON**, 25° C., Exciter-in-head.
1—3000/1500 AMPERE, 6/12 VOLT, **COLUMBIA**, Synchronous.
1—2500/1250 AMPERE, 9/18 VOLT, **ELECTRIC PRODUCTS**, Synchronous, Exciter-in-head.
1—2000/1000 AMPERE, 9/18 VOLT, **ELECTRIC PRODUCTS**.
1—1500/750 AMPERE, 6/12 VOLT, **HANSON-VAN WINKLE-MUNNING**, Synchronous, Exciter-in-head.
1—1500/750 AMPERE, 12/24 VOLT, **CHANDEYSSON**, Synchronous, Exciter-in-head.
1—1000/500 AMPERE, 6/12 VOLT, **ELECTRIC PRODUCTS**.

ANODIZERS

1—4000 AMPERE, 40 VOLT, **CHANDEYSSON**, Exciter-in-head.
1—1000 AMPERE, 40 VOLT, **CHANDEYSSON**, 25° C.
1—1000 AMPERE, 30 VOLT, **IDEAL**, Exciter-in-head.
1—750 AMPERE, 60 VOLT, **HANSON-VAN WINKLE-MUNNING**, Synchronous, Exciter-in-head.
1—500 AMPERE, 25 VOLT, **CHANDEYSSON**, Synchronous, Exciter-in-head.
1—400 AMPERE, 40 VOLT, **M.G.C.**, Exciter-in-head.

RECTIFIERS

1—2000/1000 AMPERE, 6/12 VOLT, **G. E.**, COPPER OXIDE, with Manual Control.
1—2000/1000 AMPERE, 6/12 VOLT, **G. E.**, brand new selenium stacks, with "On-load" Automatic Voltage Regulator.
1—**GREEN SELECTOPLATER**, 1800 AMPERE, 12 VOLT, 220/3/60.
2—**UDYLITE-MALLORY**, 1500/750 AMPERE, 6/12 VOLT, Control.

SPECIAL

1—20' x 4' x 3' H-VW-M Semi-Automatic for nickel.
1—H-VW-M Full-Automatic Plating Machine, 87' long, 39" lift, was used for copper and nickel.
1—H-VW-M Full-Automatic Plating Machine, 87' long, 39" lift, was used for chrome.
1—H-VW-M Full-Automatic Plating Machine, 40' long, 39" lift, was used for cleaning.
1—Production Pipe Polishing Machine, Model 101, Motorized.
2—**BONCI** Enamelers, No. R-100, and No. R-200.
1—**K-4** SEMI-AUTOMATIC BUFFING MACHINE.
3—**U. S.** ELEC. TOOL, Mod. 110, TWIN 15HP POLISHING LATHES.
1—MODEL "A" PRESSURE BLAST.

Above is partial list only. Write to us for all your requirements for Plating, Anodizing and Metal Finishing

WIRE—PHONE—WRITE

M. E. BAKER CO.

25 WHEELER STREET
Kirkland 7-5460 CAMBRIDGE 38, MASS.

Industry News

Electrostatic Spraying of Plastisol Announced by Scientific Electric and United Chromium. First successful process for electrostatically spray-coating vinyl plastisols on fabricated wire baskets, dish drainer racks, display racks and other wire goods on a production-line basis, was announced jointly by Scientific Electric, Garfield, N. J., designers and manufacturers of high frequency and high voltage equipment, and United Chromium Division of Metal & Thermit Corporation, metal finishing specialists.

Electrostatic spraying of plastisol is more than twice as fast as conventional dip-coating, completely eliminates plastisol wastage due to "running," drastically reduces the intermittent handling ordinarily required in dip-coating, and produces a superior coating in terms of uniformity and appearance to that obtained by dip methods, it is claimed. The entire operation is conveyorized; the actual spraying is automatic.

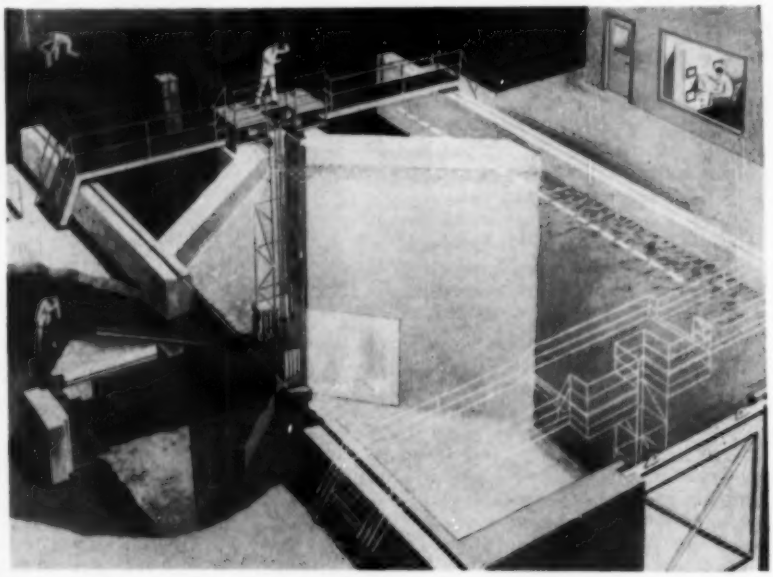
The process makes use of "Ionic Guns" with newly developed "Atomic Nozzles" and powered by a 140-K.V.P. ionic High Potential Power Supply to spray an ionized "mist" of plastisol around the object to be coated. The "mist" is able to reach and deposit evenly over the entire surface—inside and out—of intricate wire goods. The equipment is an adaptation of Scientific Electric's standard line of ionic high potential spraying equipment. The plastisol was specially formulated by United Chromium for electrostatic spray-coating.

Production rate depends upon the number of guns used on the line—the more guns the faster the work rate. Each power supply can handle up to 12 guns; an average installation would utilize 4 guns.

Flame Coating—Continental Coatings Corporation of Illinois, Chicago, has signed an exclusive license agreement with Armour Research Foundation of Illinois Institute of Technology, Chicago, to use the latter's patents in "Flame Spray Ceramics" in the service contract applicator field.

The "Flame Spray Ceramics" process is a novel method for coating a wide variety of solid forms, such as metals, glass, and ceramics. The spray coatings are applied by feeding powdered ceramic materials through a simple flame gun.

"Flame Spray Ceramics" are sintered layers of refractory and chemically inert



Proposed Nuclear Reactor, the first to be owned and operated by private industry for research in industrial and humanitarian fields, as seen in an artist's "cutaway" conception. Eight of the nation's leading industrial companies plan to build and operate the facility which will be called Industrial Reactor Laboratories. Other companies are expected to announce their participation shortly. It is expected to be ready for use a year after the start of construction scheduled to begin in early fall. AMF Atomics Inc., a subsidiary of American Machine & Foundry Company, in addition to being a participating company in the Industrial Reactor Laboratories, will also build the reactor. In addition, the companies participating in the formulation of the plans include the American Tobacco Company, Continental Can Company, Corning Glass Works, International Nickel Company, Chas. Pfizer & Co., Inc., Socony Mobil Oil Company Inc., and the United States Rubber Company

LE ROY MACHINE CO., LE ROY, NEW YORK

COMPARATIVE FINISHING COSTS FOR JET ROTOR COMPRESSOR DISCS

FINISHING METHOD	FINISH TIME	COST PER DISC	QUALITY	DISCS PER YR.	COST PER YR.	PROD. INCR.	COST SAVINGS
FILE AND WIRE BRUSH	18 HRS.	$124.92	VARIED	231	$28,870	—	—
SUPERSHEEN DBF-200 BARREL	4 HRS.	$ 5.68	UNIFORMLY GOOD	1040	$ 5,907	450%	$124,000

HOW AIRCRAFT PARTS FIRM SAVED $124,000 WITH ONE SUPERSHEEN BARREL

This Almco SUPERSHEEN fixture-type barrel is paying for itself every week.

Compressor rotor discs for jet aircraft must be finished to rigid Air Force specifications at the Le Roy Machine Co., a New York manufacturer of automotive and aircraft parts. Above you see the final inspection of these parts, just barrel finished. Inspected under powerful magnifying glass, critical break-edges of the discs are right down to A. F. specs.

"Supersheen methods were largely responsible for achieving and maintaining the high quality required for aircraft manufacture," reports R. O. Braaten, Le Roy project engineer. Prior to the installation, the rotor discs were deburred by file and wire brush.

Then an Almco finishing engineer recommended that some sample discs be barrel finished . . .

In Almco's Newark laboratory, it was found that deburring these parts required tough, Supersheen bonded abrasive chips, ⅛ in. steel diagonals and abrasive compound to meet strict A. F. requirements and yet get the fastest possible cutting, grinding and polishing action.

That's how the SUPERSHEEN METHOD cut finishing time from 18 to 4 hours per disc, achieving absolutely uniform finish. Too, production was increased 450 percent, saving $124,000. annually on deburring costs.

Remember, the SUPERSHEEN METHOD is a complete barrel finishing service that begins with an Almco finishing engineer analyzing your specific problem. Then free tests are conducted on your sample parts at the Almco laboratory nearest your plant. The correct media, compounds, barrel rpm, water level and time cycle are determined in order to precision finish those parts; often a complete test can be run in a matter of hours.

Helping you select the correct size barrel or barrels for your operation is the next step. And whenever you need expert help in finishing problems, ALMCO is at your service. For further information and literature, write, Almco, 104 Marshall St., Albert Lea, Minn.

ALMCO

Division of Queen Stove Works, Inc.,

ALBERT LEA, MINN.

SUPERSHEEN METHOD FOR *SPEED FINISHING*

ALBERT LEA • NEWARK • DETROIT
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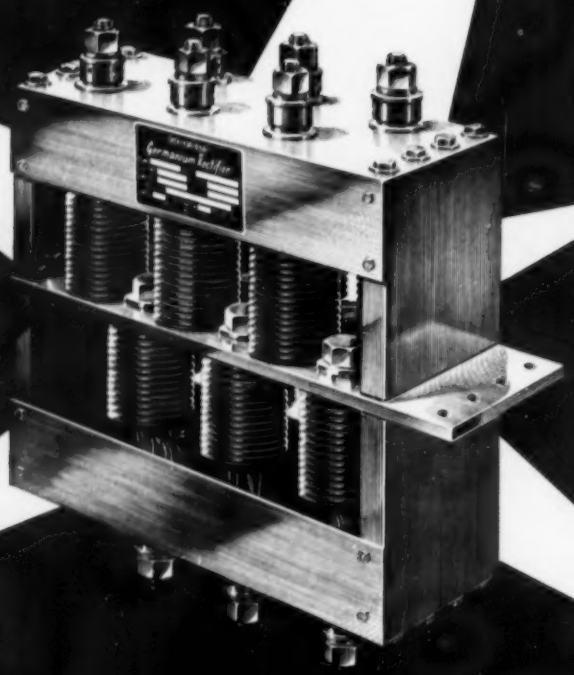
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1010.

International Rectifier Corporation

proudly presents

International germanium power rectifiers!



This new line of
Power Rectifiers features:

- High efficiency . . . up to 97%
- Lowest forward drop
- High reverse to forward ratio
- No reforming required after storage
- Unlimited life expectancy
- Ratings:
  26 to 66 AC input volts per junction
  150 to 100,000 amps DC output

Operating temperature range
55 C to + 75 C

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Industry News

materials, such as aluminum oxide and zirconium oxide.

Since the two basic "Flame Spray Ceramic" coatings—aluminum oxide and zirconium oxide—are stable metal oxides, they cannot oxidize further.

Continental Coatings' agreement with the Foundation gives it the right to sub-license other organizations throughout the country in the contract applicator field.

It is claimed that coatings resulting from the new process are superior to those produced by the metallizing processes because of their greater resistance to heat and chemical stability. Technique of application is similar to that required for the metallizing processes.

The spray coatings do not require that the metal or other base be heated unduly—as opposed to ordinary ceramic coatings which require heating both metal and ceramic to high temperatures.

Big Unusual Job—An unusual order for electroplating large odd shaped rings has been received by American Plating, Inc., Zelienople, Pa. The oblong rings,

Photo shows two large odd shaped rings which have received zinc plating with a die chromate finish at American Plating, Inc., Zelienople, Pa. The rings, processed with a large automatic rotary plater, will be used by the world's largest oil company to house their gasoline station identification signs

seven feet long and four and one-half feet high, are manufactured by Ellwood City Iron and Wire Company to house gasoline station identification signs for the world's largest oil company. To combat corrosive weather affects, the rings receive a zinc plating with a die chromate finish. This process is accomplished by a special large automatic rotary plating machine at American Plating, Inc.

IT FIGURES...

Coveralls courtesy of Worklon Inc.

YOU WANT MAXIMUM RESISTANCE TO CHEMICALS, WEAR AND LAUNDERING IN WORK CLOTHES

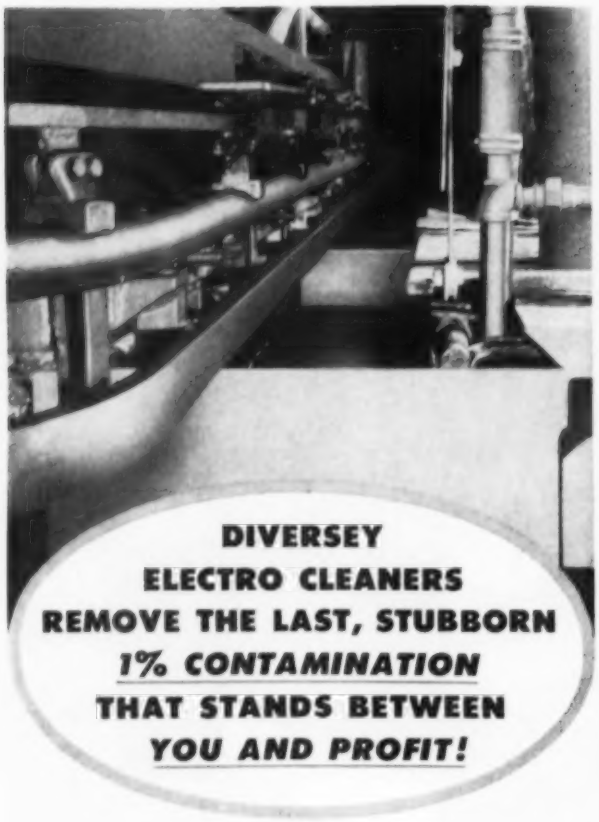
GET IT FOR LESS WITH DYNEL

THE FIBER THAT FIGURES IN YOUR FUTURE

Tests prove that shirts, pants, coveralls and lab aprons made of 100% DYNEL fiber last four or five times longer than comparable garments made with traditional fibers. DYNEL is unaffected by most chemicals; can be cleaned or decontaminated in acids – without harm; will not support combustion. It is washable, retains strength wet or dry, dries quickly. **YES, IT FIGURES.** You save because you get more for your money in 100% DYNEL work clothing. It's so long wearing that many laundries specify it for industrial rental clothing. To find out how much DYNEL can save in your operation, write us today. Dept. P.

Textile Fibers Department, Carbide and Carbon Chemicals Company,
A Division of Union Carbide and Carbon Corporation
UCC 30 East 42nd Street, New York 17, N. Y.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1012.



DIVERSEY ELECTRO CLEANERS REMOVE THE LAST, STUBBORN *1% CONTAMINATION* THAT STANDS BETWEEN *YOU AND PROFIT!*

Even though 99% of contamination on steel, brass and zinc castings can be removed by soak cleaning . . . it takes Diversey's specialized electrocleaning chemicals to *remove* the *final 1% contamination*. Then *profits begin!*

PROFIT... from Diversey's fast action in removing contamination without harm to the base metal!

PROFIT... from fewer rejects, less reworking than ever before!

PROFIT... from Diversey's long solution life with no redepositing of soil on either tank or cleaned work.

PROFIT... from all these outstanding Diversey advantages:

- EXCELLENT INHIBITION—USE EITHER REVERSE OR DIRECT CURRENT, AND WIDE RANGE OF TEMPERATURES AND CONCENTRATIONS
- FOAMING ACTION CONTROLLED, FUMING MINIMIZED
- HIGH CONDUCTIVITY OVER WIDE RANGE OF CURRENT DENSITIES
- EXCELLENT WATER-SOFTENING ACTION

FOR STEEL:	*FOR BRASS:*	*FOR ZINC:*
DIVERSEY No. 12	**DIVERSEY No. 101**	**DIVERSEY No. 505**

THE DIVERSEY CORPORATION

1820 Roscoe Street, Chicago 13, Illinois

(In Canada: The Diversey Corporation (Canada) Ltd., Port Credit, Ont.)

Industry News Briefs

● A consent decree was entered on August 1, 1955, in federal court in New York in favor of **The Battelle Development Corp.** for infringement of its chemical polishing patent No. 2,446,000. The defendant was the **Harstan Chemical Corporation.** Battelle's licensee in the New York area, **The Enequist Chemical Company, Inc.**, was a joint plaintiff with Battelle.

● A western regional sales engineering office has been opened by **Fielden Instrument Division, Robertshaw-Fulton Controls Co.** to provide western manufacturers and research organizations with engineering service and counsel on latest industrial instrumentation techniques.

● **Hewitt-Robins Incorporated,** manufacturer of rubber and machinery products, plans to acquire the business, manufacturing facilities and assets of the **W. A. Jones Foundry and Machine Company,** Chicago, maker of heavy-duty speed reducers, pulleys, gears and other accessories used to drive machinery.

● **Inductotherm Corporation,** manufacturer of the Inducto line of high frequency heating and melting equipment, has moved from Glenolden, Penna. to a larger, more modern plant at Delanco, N. J.

● A newly formed Department of Product Research and Development has been announced by *Herbert W. Rogers*, president of **Lithium Corporation of America, Inc.** *Walter M. Fenton*, formerly sales manager of the company, has been appointed Director.

● Nuclear power production and the construction of high temperature-high pressure power plants will highlight the 18th annual American Power conference at the Hotel Sherman, Chicago, March 21–23.

● **Backus & Spencer,** Cleveland, O. has been appointed sales representative for **Vanton Pump & Equipment Corp.** in the Northern Ohio Territory.

● To provide quicker, more convenient service to customers in the Chicago territory, **United Chromium Division of Metal & Thermit Corporation** has established warehousing facilities at 415 East 131 Street, East Chicago, Ind.

● **Lord Chemical Corp.** has just completed a new 6,000 sq. ft. addition to its plant at York, Pa. This is the fourth successive addition to be made to the plant during the past 2½ years. The wing will be used for the storage of Lorco tumbling compounds, aluminum-oxide chips and "P.S." plastic starch cream.

● **Western Carbide Corp.** has been formed as a subsidiary of **Superweld Corp.,** No. Hollywood, Calif., to manufacture and market proprietary products. The new corporation is making a hardfacing paste and several hardfacing bulk products.

● A new laboratory balance that combines large capacity with high sensitivity, has been announced by **The Torsion Balance Company,** Clifton, N. J.

● A branch office of **Syracuse Supply Co.** Syracuse, N. Y., was recently designated an authorized distributor by **Carboloy Department** of **General Electric Company, Detroit.**

● **General Electric** has formally opened its new radiation laboratory to delve further into peacetime uses of the atom.

● Production was resumed recently by the **Stamping Division of the Eaton Manufacturing Co.** in its new and completely modernized plant, at Cleveland, designed to meet the increased demand by the automotive industry for the division's specialized stamped and plated products.

COOL
Savings for You

CUT
with
UNIT SISAL
SELF-COOLING
"UNIT" DESIGN
circulates air throughout every fibre, even in high-speed operation. Keeps work always cool.
EXTRA-FLEXIBLE
INDIVIDUAL "UNITS"
Apply just the right amount of buffing pressure at every point on both flat and curved work . . . reach into every crevice for superior polishing action on irregular surfaces.
CUTS and COLORS
in ONE OPERATION
Cloth-wrapped Sisal units provide two-in-one performance! By combining fast cutting and high-lustre finishing, this buff actually accomplishes both cutting and coloring in the same operation.
Available with Permanent Steel Centers or Patented Centerless Construction.
LICENSED
under the Blue Sisal Buff
Pat. No. 2642706

"For the job that's tough—use an AMERICAN BUFF—"

PRODUCTION COSTS

SELF-COOLING AUTOMATIC

and OPEN-FACE SISAL BUFFS

SAVE TIME!

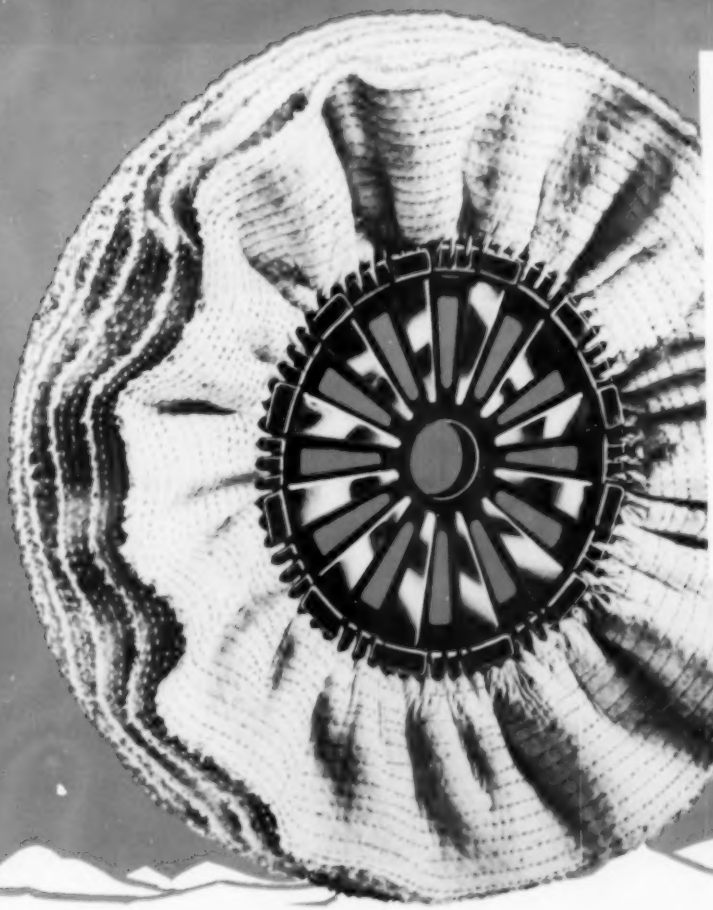
Automatic "air-cooled" buffs run faster—safely—to increase your production volume. Self-cooling construction won't burn or discolor metals . . . stays cool even at highest speeds.

SAVE WORK!

Bias Sisal and stitched double Cloth combined in flexible construction do the work in *fewer passes*. You save work . . . save buffs.

SAVE MONEY!

Economical Automatic Sisal Buffs wear longer . . . do more. Their flexible design retains buffing compound along both leading and outer edges—actually uses *less* compound!



UNIQUE CLOTH and BIAS SISAL "OPEN" BUFF

EXTRA-LOOSE CONSTRUCTION COOLS as it RUNS

Air-cooled open "ruffle" design directs cooling air currents over the work . . . permits faster speeds without heat discoloration.

CUTS AND COLORS IN ONE OPERATION

Ideal "looseness" gets into small openings and crevices . . . speeds work on both flat and contoured surfaces. Fast-cutting bias Sisal and stitched double bias Cloth turn out a finished job easier, faster, better!

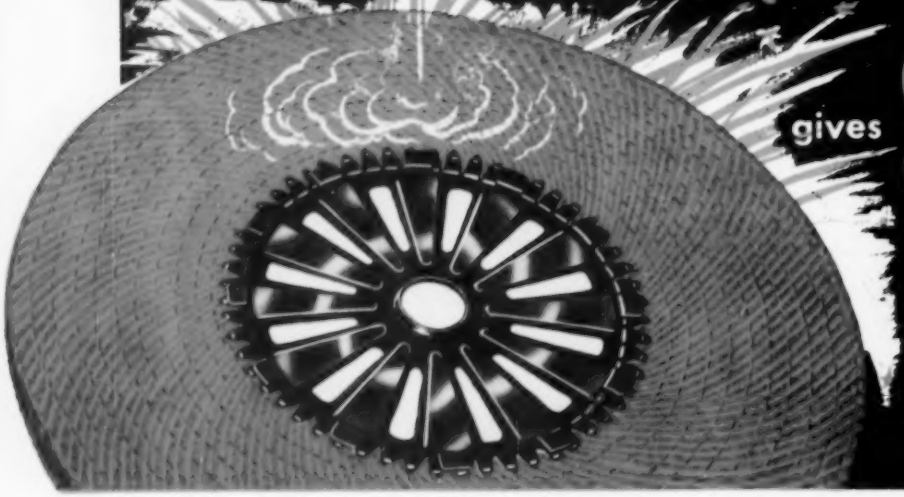
Available with or without cloth

TEST these sensational new Buffs *in your own plant*. You'll find Automatic "air-cooled" Buffs are *made to order* for greater efficiency and economy on practically *every* buffing job!

AUTOMATIC BUFF CO. DIVISION OF American Buff Company

EXCLUSIVE with AMERICAN BUFF...

The "Golden Treatment" gives SISAL remarkable new buffing qualities



There's "GOLD" for you in production with the improved buffs

An exclusive, special adhesive now holds American Buff Company's Sisal Buff fibres more closely together—gives them greater capacity to hold buffing compounds. Yet this "Golden Treatment" . . . the fruit of 4 years of research and experiment, does not produce either excessive softness or hardness in the buff's density. While its texture is virtually unchanged, its effectiveness is appreciably improved. You'll identify the new benefits by the "golden" tinge with the "golden touch."

- **Better buffing action with increased compound absorbency**
- **Faster cutting with retained compound**
- **Longer wear with closer Sisal fibres**
- **Lower costs through increased speeds, reduced waste of compound, fewer passes**

Available in all American SISAL BUFFS — Centerless or Permanent Center — or CONVENTIONAL type Sisal.

FREE ***NEW*** **SISAL BUFF SELECTOR**

HANDIEST BUFFING HELPER EVER OFFERED!

Picks the right buff for every job — quick as a wink! Reverse side contains jiffy calculator that instantly figures Spindle speeds, Surface speeds, etc. Sent FREE to Buff Users . . . write for yours TODAY

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American Buff Company

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CAlumet 5-1607

Industry News

FRANCIS J. STOKES

Francis Joseph Stokes, 81, industrialist and naturalist whose home was at 629 Church Lane, Germantown, Pa. died on August 1 at Germantown Hospital, after a brief illness.

He was widely known and respected in the pharmaceutical industry for his extensive personal contributions to modern methods of manufacturing.

Stokes was president of the Stokes company until 1948, when he became chairman of the board, holding this position until his death.

Stokes had a keen interest in education. He was a trustee of Bryn Mawr College (his wife's alma mater), and for many years was chairman of its buildings and grounds committee. He was also for many years overseer of the William Penn Charter School of Philadelphia, a committee member of the Germantown Friends School, and president of the Campus Club of Haverford College.

Stokes is survived by his wife, Lelia Woodruff Stokes, a native of Scranton, Pa., four sons, F. Joseph Stokes, Jr., of Philadelphia; Allen W. Stokes, of Logan, Utah; Henry W. Stokes, of Hingham, Mass.; and David E. Stokes, of Jenkintown, Pa.; and a daughter, Alison, (Mrs. Paul B. MacLean), of Hamden, Conn. He had 19 grandchildren.

DAVID CRAMPTON

David Crampton, Chief Chemical Engineer of Wallace & Tiernan Incorporated, was drowned on August 28th at Mantoloking, New Jersey, when caught in a heavy undertow.

Crampton had been with Wallace & Tiernan Incorporated for twenty-four years, having entered their Development Engineering Department in 1931, following his graduation from Cornell University Engineering School. He held a number of patents in the field of water treatment, was a recognized authority in the refrigeration field, and supervised all engineering work at the Company's chemical plants at Buffalo and Genesco, New York, Dover, Ohio, and Belleville, New Jersey. He was also a well-known yachtsman, having sailed in the International Class from the Larchmont Yacht Club.

Crampton was a member of the American Chemical Society, American Society of Oil Chemists, American Society of Refrigeration Engineers and was a registered Professional Engineer in New York and Ohio. He leaves his wife, three daughters, his father, and two sisters.

PAPERS AND ABSTRACTS

FOR WASHINGTON CONVENTION, JUNE 17-21, 1956

Manuscripts are now being solicited for the 43rd Annual AES Convention, to be held at the Hotel Statler, Washington, D. C., June 17–21, 1956. Theme of the educational sessions is "PROGRESS IN THE FINISHING OF METALS." General subjects relating to the field are needed, but the Educational Committee desires papers on the subjects of *organics* and *instrumentation* in particular.

Triplicate copies of abstracts (about 100 words) should be forwarded to Convention Educational Chairman, Dr. Abner Brenner, National Bureau of Standards, Washington, D. C., *before January 1, 1956.* Complete manuscripts should also be sent in triplicate to Dr. Brenner *before March 1, 1956.*

For further information, write to the Executive Secretary
AMERICAN ELECTROPLATERS' SOCIETY
445 Broad Street, Newark 2, N. J.

New Jobs
for the World's
Most Useful
Metal
—Straits Tin

Tin mining in Malaya. Here a test boring is being removed.

New tin-alloy platings improve products, cut costs

The number of new ways you can use Straits Tin to make better products at lower cost is today growing faster than ever, and lower cost means higher profit.

New tin-alloy platings, for example, are giving increased protection against corrosion to steel.

Tin-zinc and tin-cadmium platings have been found to be many times as resistant to corrosion as either zinc or cadmium alone.

Tin-copper electrocoatings are increasingly useful. Red bronze can now be used as a more durable undercoating for chrome—white bronze for applications similar to those of silver plate.

And because tin is as handsome as it's hard working, a new tin-nickel alloy is proving itself a more attractive, more corrosion-resistant decorative plating than the conventional chromium on nickel copper.

New plating alloys represent just one of the ways Straits Tin can do more for you today.

Over a third of the global tin output is mined and smelted in Malaya. Known as Straits Tin, this metal is over 99.87% pure, and is world-famous for its absolute reliability of grade.

Whether you're planning a new product, working to improve an old one, or simply seeking ways to avoid the squeeze between rising manufacturing costs and resistance to higher product prices, a careful reappraisal of the properties of Straits Tin may uncover a profitable answer to your problem.

Write now for any information you may need about versatile, plentiful, economical Straits Tin.

A copy of our new booklet on Straits Tin is yours for the asking.

MALAYAN TIN BUREAU

THE MALAYAN TIN BUREAU

Dept 31-X, 1028 Connecticut Ave., Washington 6. D. C.

Four Of A Kind For Better Barrel-Finishing. The new Norton Tumblex "T" abrasive brings you an unbeatable combination for top performance: non-wedging triangular shape; fast-cutting bonded ALUNDUM* abrasive; and four sizes for the widest range of applications.

Brand new! . . . Norton TUMBLEX "T" — bonded, triangular shape tumbling abrasive

Users report Tumblex "T" abrasive brings many new "TOUCH of GOLD" benefits to barrel-finishing

Here's one of the most revolutionary barrel-finishing innovations ever developed. In typical on-the-job tests, Norton customers report that the new Tumblex "T" tumbling abrasive:

- ***"cuts tumbling cycle time from five hours to one hour."***
- ***"finishes steel and magnesium parts that could never before be barrel-finished."***
- ***"completely removes burrs from stainless steel parts in four hours. Abrasives previously used failed to do so in 12 hours."***

Everything about Tumblex "T" abrasive is designed for better barrel-finishing.

Its uniform triangular shape and size prevents wedging in recesses of parts.

Made of famous Norton ALUNDUM abrasive, it cuts fast, with no compound needed — resulting in shorter time cycles and lower costs per piece finished.

It provides maximum surface contact with parts being processed, assuring top quality work in fastest time.

It wears down evenly, keeping the same triangular shape. No small chips to lodge in holes, slots, etc. — and when worn down it can be used on parts requiring a smaller size abrasive.

Its lightness means less weight required to fill the barrel. Results are more uniform finish, without roll-in or roll-over of edges of parts.

Its chemical inertness, unaffected by acids, compounds or detergents, prevents spoilage common to other types of abrasive.

Send Your Work Samples

to our newly enlarged Sample Processing Department. Let us prove to you how the latest barrel-finishing equipment and techniques can improve your product quality and cut your finishing time and costs. NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

G-294

NORTON

ABRASIVES

Making better products... to make your products better

NORTON COMPANY: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING DIVISION: Coated Abrasives Sharpening Stones • Pressure Sensitive Tapes

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

Personals

Stareck and Loengard

A dinner was held recently in New York to honor **Dr. J. E. Stareck** upon h's completion of 20 years service with United Chromium. Dr. Stareck was presented with a gold watch by **R. O. Loengard,** vice-president of Metal & Thermit Corporation.

Dr. Stareck has held the position of director of research with United Chromium since 1941; and when United Chromium became a division of Metal & Thermit Corporation in May of this year, he was made director of research for Metal & Thermit.

Dr. Stareck attended the University of Kansas where he received his MA in 1930. While working on the thesis for his doctorate he discovered the process of color plating now known as "Electrocolor." In 1933 he was awarded the Roy Cross Research Fellowship to further his studies of color plating. Dr. Stareck received his Ph.D. in chemistry in 1934 and in 1935 joined United Chromium in the research laboratory. He continued his research on "Electrocolor" and shortly developed the related process of electrodepositing patterns known as "Patternplate." In 1939 he was awarded the Edward Longstreth Medal for these contributions in the field of coloring metals.

Other processes developed under his direction in recent years are Copper Plating from Pyrophosphate solutions, High Speed Chromium Plating, and Crack-Free Chromium.

The appointment of **Robert U. Haslanger** as director of industrial sales, Stauffer Chemical Company, has been announced by **Hans Stauffer,** president. Haslanger, who will continue to make his headquarters in New York City, had been Eastern sales manager. The appointment fills the vacancy created by the death, some months ago, of **T. A. Haschke.**

William E. Hibbard, one of America's leading welding engineers, has joined Superweld Corp., No. Hollywood, Calif., in the new position of application engineer, President **R. E. Jones,** announced today.

A rated welding engineer with more than twenty years' experience in mechanical and metallurgical engineering, Hibbard was a field engineer for Fabriform Metals, Los Angeles, prior to joining Superweld. Before that he spent eleven years with Bergstrom Alloys Corp., Los Angeles, in key engineering positions. While with Bergstrom he was resident engineer during the construction of Shasta Dam, and a consulting engineer to the government on the problem of setting up welding programs in government installations. He also held important posts with the Caterpillar Tractor Co., Peoria, Ill.

Superweld is inaugurating an accelerated sales program to triple the company's sales. Superweld specializes in copper furnace brazing and nickle alloy brazing under the trade name of Superwelding, and also performs silver brazing, bright annealing, and high-permeability annealing. The company's products include brazing and hardfacing alloys in both powder and paste form.

The Leland Electric Company Division of American Machine & Foundry Company has appointed **Rex D. Marsh** vice president in charge of sales and **Walter T. Buhl** vice-president in charge of engineering and manufacturing, according to **Morehead Patterson,** AMF board chairman and president.

Marsh joined the Leland Electric Company Division in April, 1953 as sales manager. He was formerly president and a director of the Canadian subsidiary of Bowser Inc. Buhl, a consulting engineer for the past four years, was formerly director of research of Whirlpool Corporation.

Buhl

Marsh

AMF's Leland Electric Company Division, manufactures fractional and integral electric motors, generators, and related electrical equipment. Its Canadian operation, Leland Electric Canada Limited, Guelph, Ontario, is an AMF subsidiary.

The Permutit Company, New York, N. Y., has announced through **H. W. Foulds,** president, the appointment of **Charles A. Weida** as personnel manager.

Weida

Weida received his A.B. in Economics from Yale University and his M.A. in Business Administration from Columbia University. Upon graduation, Weida was employed by Sears-Roebuck in a merchandising capacity. Since then he has been with Sperry Gyroscope, American Cynamid and Bridgeport Brass where he handled personnel and industrial relations. Weida is a member of the New York Personnel Management Association.

The promotion of **Dr. David B. Parkinson** and **John H. Harris** to vice-presidencies of the Brush Electronics Company, one of Clevite Corporation's largest units, was announced today by **Douglas C. Lynch,** president of Brush. Harris will be vice-president and general works manager, and Dr. Parkinson will be vice-president and general engineering manager.

Dr. Parkinson holds his doctorate for work in the field of atomic physics at the University of Wisconsin. He performed a wide variety of developmental work during a 10-year association with the Bell Telephone Laboratories. He is the recipient of the Presidential Medal for Merit and the Potts Medal of the Franklin Institute for outstanding work in the development of fire control equipment during the war. Dr. Parkinson joined Brush Electronics in 1948, and is responsible for all design and production engineering at the company.

Parkinson

Harris

Harris, a University of Minnesota graduate, joined Brush Electronics in 1944 after holding management and manufacturing positions with Minneapolis-Honeywell Regulator Company and with Lear, Inc. He is responsible for the company's direct manufacturing, production control, maintenance and materials procurement.

M. W. Reynolds, vice-president and general manager of Acheson Colloids Company, Port Huron, Mich., announces the appointment of **John W. Shier** as assistant general manager of the company. Shier was the company's production manager, and **Bart C. Dickey,** formerly process development engineer, has been promoted to fill this position.

Shier

Dickey

Shier, who joined Acheson Colloids as a plant engineer in 1949, has served this past year as chairman of the Detroit Section of the American Institute of Chemical Engineers, and is a member of the Institute's National Committee on Professional Guidance. He is also active in the Engineering Society of Detroit. Before coming with the Acheson organization, Shier was employed as a chemical engineer by the Heyden Chemical Company in Detroit. He attended the University of Michigan and was graduated as a Chemical Engineer from Wayne University.

Dickey was graduated with a B.S. in Mechanical Engineering from Wayne University in 1947. He had been previously employed by the Beloit Iron Works and the Port Huron Sulphite & Paper Company. He is a member of Tau Beta Pi and Pi Tau Sigma.

Five assignment changes in the field sales and service organization of Diamond Alkali Company were announced by **W. H. McConnell,** vice-president-sales.

Robert R. Wood, a member of Diamond's New York sales staff since January, 1949, has been promoted to the position of special staff assistant in the sales department at Cleveland, effective approximately September 1, 1955.

His successor at New York is **C. Robert Powell,** who has been transferred from Cincinnati, where he is being succeeded by **Charles H. Gillespie** as sales representative in the Louisville area.

Charles B. Kayser, on Diamond's Cincinnati sales staff since May, 1948, will now represent the company at Columbus, with headquarters at Columbus, Ohio.

Louis P. Lambros, formerly of Diamond's Central Order Department at Cleveland, has been named to succeed Kayser in Cincinnati.

William I. McGowan, president of Chemical Products Corporation, East Providence, R. I., has announced that the company has appointed the distributing firm of Gossett and Hill Company, Chicago, Ill., as agents for their Chem-o-sol (vinyl plastisols) and Nelco lacquers for plastic moldings in Illinois, Wisconsin, Indiana, and Metropolitan St. Louis.

Gossett

Hill

Edward Moran of Chemical Products Corporation will operate out of the Gossett and Hill Company offices as technical representative.

Gossett and **Hill** are both graduate mechanical engineers with wide experience in plastic and rubber fields. Gossett, president of Gossett and Hill Company, is president of the Chicago section of Society of Plastic Engineers and a graduate of Purdue University. Merton E. Hill is a graduate of Northwestern University. Both men were captains in Air Force Procurement at Wright Field during the last war.

Moran has spent the past two years in the Chemical Products Corporation's laboratories in East Providence, R. I.

The company's Chem-o-sols have found wide acceptance in the electroplating rack, tank, electrical appliances, cloth, and yarn coating fields. They may be dipped, sprayed, knifecoated, or molded.

Nelco lacquers are widely used for decorative and protective finishes for polystyrene and other plastic moldings.

Garth M. McLeod, formerly news editor for Design News, has joined the public relations branch of the Carborundum Company, according to an announcement by **E. Dent Lackey,** public relations manager of the company.

McLeod will supervise Carborundum's technical article program and will conduct editorial cooperation between the company and the industrial and technical press publications.

A mechanical engineer graduate of Northeastern University, Boston, Mass., McLeod also did graduate work at the University of Chicago.

Prior to his association with Design News McLeod was employed as a design engineer with the Electronic Division of Sylvania Electric Products, Inc.

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CORROSION can be checked and prevented—and Storts can help you to do it—with tanks made of corrosion-resistant metals and alloys, with lined tanks and with coated tanks. Thousands of Stortswelded tanks are in plating service today, standing up under severe corrosion conditions, giving the continuous performance that keeps Storts customers happy.

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Personals

R. E. Rogers, formerly manager of the Los Angeles branch of The Foxboro Company, Foxboro, Mass., has been appointed manager of the instrument company's West Coast sales activities.

Well known to instrument users throughout the territory, Rogers has headed the Los Angeles office since 1946, formerly serving as industrial engineer at the Tulsa and New York offices. He plans to make his new headquarters at Foxboro's newly completed branch factory in San Leandro, California.

Replacing Rogers as Los Angeles branch manager is **E. W. Pitt** who has transferred from the Shreveport, La., office where he has been branch manager since 1948. **D. P. Thomas,** industrial engineer, has been promoted to branch manager at Shreveport.

In other new appointments, **M. F. Parr** has been made regional engineer at San Leandro; **C. E. Heegard** has been added as industrial engineer at Los Angeles; and **C. J. DeVilbiss** has transferred from Dallas to serve as industrial engineer at Shreveport.

The changes are coincident with the establishment of ten new sales regions, organized for maximum service to industrial instrument users.

Oakite Products, Inc., manufacturers of industrial cleaning and metal treating materials, have announced the appointment of **John C. Mullarkey** as the company's technical service representative in Phoenix, Arizona. Mullarkey, formerly a contractor in Southern California, recently completed an intensive training course at Oakite's New York Headquarters and in the field.

Everett M. Jones, executive vice-president, Simplex Valve & Meter Company, Lancaster, Pa., has announced that **Frank E. Gerlitz** has been appointed to the position of vice-president in charge of sales. In his new capacity, Gerlitz will be responsible for stepping up sales of Simplex products and services.

Gerlitz

Gerlitz started with Simplex in January 1940 as a sales engineer, was promoted to assistant sales engineer in June 1945; made sales manager in April 1947 and appointed to his new capacity in July 1955.

He is a graduate of Bucknell University, holding a bachelor's degree in Civil Engineering, is a member of the AWWA, FSIWA, and ASCE.

J. Dean Herman, chief chemical engineer, **Gerald A. Munson,** chief mineral engineer, and **John Talley, Sr.,** branch manager, are the latest organizational changes to be announced by **Herbert W. Rogers,** president of Lithium Corporation of America, Inc.

Herman has returned to the Minneapolis office after serving at the firm's new Bessemer City, North Carolina chemical plant. A University of Minnesota graduate, he joined Lithium Corporation in 1943 as production superintendent of their St. Louis Park plant. He became assistant plant manager in 1944, and plant manager in 1947. He has been chief project engineer at Bessemer City since last year.

Munson has been transferred from the company's Hill City, South Dakota operations to Minneapolis. A native of Custer, South Dakota and a graduate of the South Dakota School of Mines and Technology, he was consultant for the corporation prior to joining the staff in 1951 to design and manage the mill at Hill City. General manager of the Bessemer City construction program last year, Munson will supervise Lithium Corporation's mining interests in the United States and Canada.

Talley has been appointed branch manager of the Black Hills operations succeeding Munson. Talley boasts the longest service record in the company, having joined the firm at its inception in 1942.

J. J. Siefen Company announces the resignation of **John F. Siefen** as president.

The new officers of the company are **I. E. Siefen,** president, **Arthur W. Sempliner** as vice-president, **J. Boatman** as secretary and **C. A. DeGroat** as treasurer and general manager.

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Aluminum Tube

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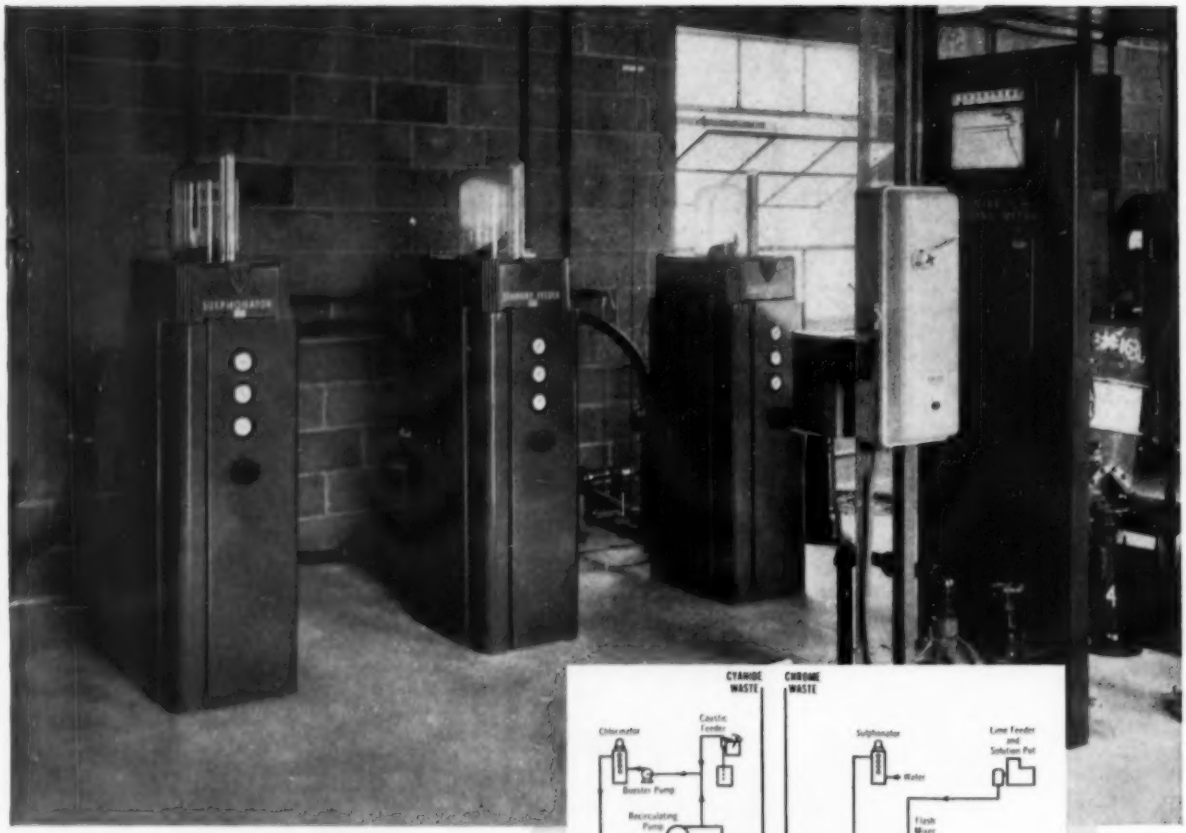

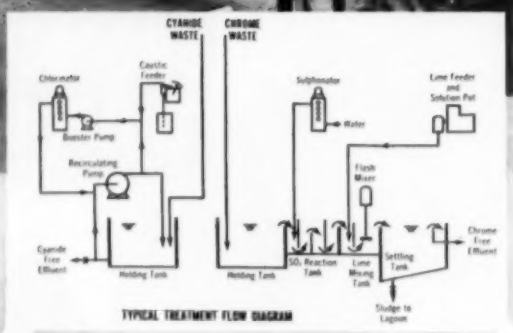

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W&T *Cyanide & Chrome Waste Treatment*

The Daystrom Instrument Division of Daystrom, Incorporated, located at Archbald, Pennsylvania, has provided a compact and efficient treating plant to destroy the toxic components of their plating waste. The treatment plant has been in continuous operation since 1953.

The cyanide bearing waste is treated with chlorine and caustic, using a W&T Water Diaphragm Chlorinator and a W&T Chemical Solution Feeder. The treatment breaks down the cyanide to harmless carbon dioxide and nitrogen gas components.

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If you would like more information on Wallace & Tiernan cyanide or chromium waste treatment, write for bulletin RA-2120-CP.

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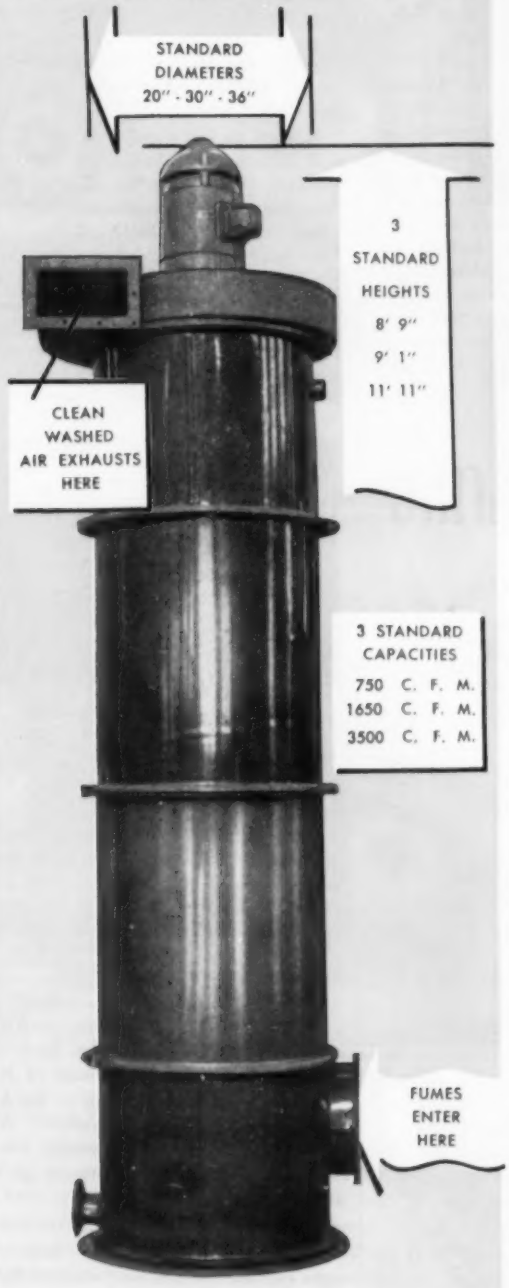
NOW, CORROSIVE FUMES EFFICIENTLY REMOVED BY NEW "PINT SIZED," LOW COST



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Absorbs noxious and corrosive fumes
Removes irritating and abrasive dusts
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The Cyclonaire is surprisingly compact—will fit almost anywhere, but it does a big fume removal job formerly possible only with expensive custom-designed units. It will safely handle corrosives in low concentrations normally encountered in fume scrubbing operations. Removal of many gases (of 1% concentration or less)—is up to 99.9% effective. Low power requirements make it very economical to operate.

In operation the Cyclonaire is a wet bed scrubber—with an all important difference. Instead of designing the unit first, then selecting a packing . . . our engineers designed the unit around Intalox saddle packing, the most efficient industrial tower packing made. The results surprised even us. We discovered that it is possible to do a big fume removal job with a small fume washer . . . when packed with Intalox!

The Cyclonaire is constructed of steel in easy-to-assemble flanged sections, secured by split ring clamps (the 36" size is bolted). All inner and outer surfaces are protected by an inert Tygon or Tygoflex plastic coating. It can be assembled in a few hours, or disassembled and reinstalled in a different location in an equally short time.

The Cyclonaire is available in three standard sizes and three capacities. (See illustration.) It is shipped as a "package" unit complete with motor and adequate Intalox packing. Special parts are available to convert standard units for unusual applications.

If you have a fume, dust or mist problem it will pay you to look into the low cost . . . pint sized . . . high efficiency Cyclonaire.

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Personals

The Permutit Co., New York, N. Y., has announced the promotions of **H. M. Appleton** and **H. Plymire,** according to **George N. Proctor,** vice-president.

Appleton has been appointed assistant plant manager of the Lancaster, Pa. manufacturing division. He will have as his direct responsibilities the office staff, production control, industrial engineering and personnel.

Plymire has been appointed to the position of plant superintendent and will be responsible for all machining and assembly operations of Permutit and Simplex Valve & Meter Company apparatus, as well as the maintenance of equipment, plant and property.

Howard C. Gebhart, former chief engineer of Kett Tool Company, Cincinnati, has been named chief engineer of Rockwell Manufacturing Company's Delta Power Tool Division plant at Bellefontaine, O.

Gebhart

He succeeds **John B. Unterweger,** who was recently promoted to factory manager.

A native of Dayton, Ohio, and mechanical engineering graduate of the University of Cincinnati, Gebhart is a registered professional engineer in Ohio and a member of the American Society of Mechanical Engineers. He served with Army Ordnance in Europe in World War II.

Alexander Shearer of Wheeling, W. Va., has been appointed assistant to the operating vice-president of Wheeling Steel Corporation, according to an announcement by **J. L. Neudoerfer,** president.

Shearer has been associated with Wheeling Steel since 1922, spending the first three years at the Beech Bottom, West Virginia plant, in the inspection department, then as mill tracer, later being made weighmaster.

In 1925, he was transferred to the General Offices in Wheeling as assistant scheduler of the Wheeling District Mills. Two years later, Shearer was promoted to scheduler, Wheeling District Mills.

In 1942, he was appointed controller, Secondary Products and, in 1945 was promoted to the position of assistant to manager of production. In August 1952, the Wheeling Steel operating official was made manager of production, which position he retained until his present promotion.

Hutchinson

Shearer

J. Gordon Hutchinson was elected comptroller of the Wheeling Steel Corporation.

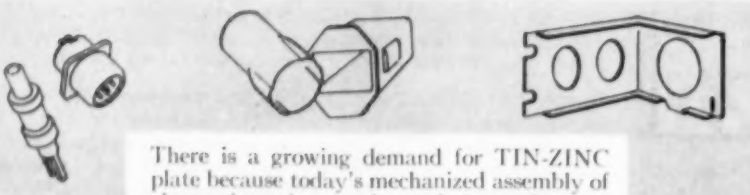
Hutchinson came to Wheeling Steel in January of this year to serve as assistant comptroller. Prior to that he had been affiliated with Lever Brothers Company of New York as general auditor, and with Price Waterhouse & Co. of New York as managing accountant.

Wheeling Steel's new comptroller attended the University of Cincinnati and the College of the City of New York. He is a certified public accountant of New York and holds memberships in the American Institute of Accountants, New York State Society of Certified Public Accountants, and the Institute of Internal Auditors.

John P. Walsh, formerly with the Foster Wheeler Corporation, has been appointed sales engineer for General Ceramics' Pyrotone Welding Backing Rings.

In his new capacity in the General Ceramics Corporation's Chemical Equipment Division, Walsh will handle sales and service of Pyrotone Rings. Formerly welding inspector and engineer for Foster Wheeler, Walsh brings to this department a wide knowledge of welding practices and problems in both field erection and shop fabrication.

TIN-ZINC for PROFITABLE PLATING of electronic parts



There is a growing demand for TIN-ZINC plate because today's mechanized assembly of electronic equipment demands *fast and permanent solderability* of parts. TIN-ZINC plated parts retain their solderability for years, require lowest soldering temperatures.

Platers profit with TIN-ZINC for other reasons too . . .

- **it plates at less than half the metal cost of cadmium**
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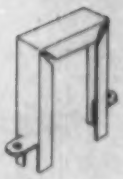

A real money-maker for platers and electronic equipment manufacturers alike, TIN-ZINC will help you get that extra business you're looking for. Write for further information on the M & T TIN-ZINC plating process.

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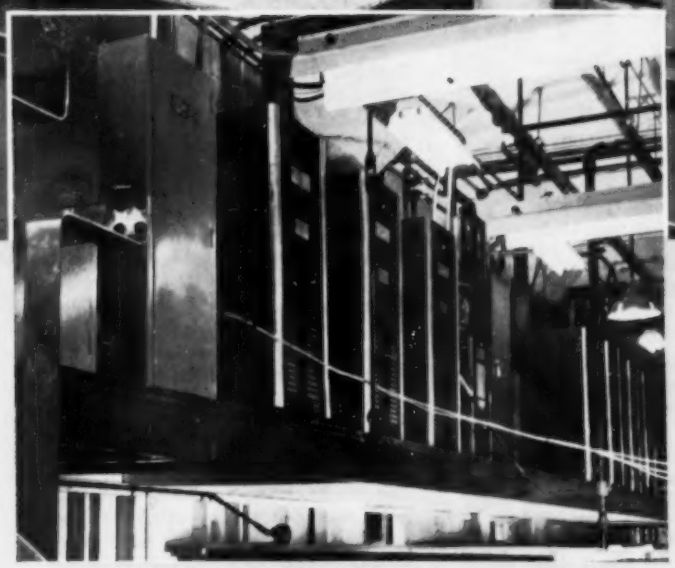

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Sel-Rex Rectifiers afford an efficient and economical power source for every electroplating application because they combine many exclusive design features and are designed and built by plating experts who thoroughly understand the needs of the industry.

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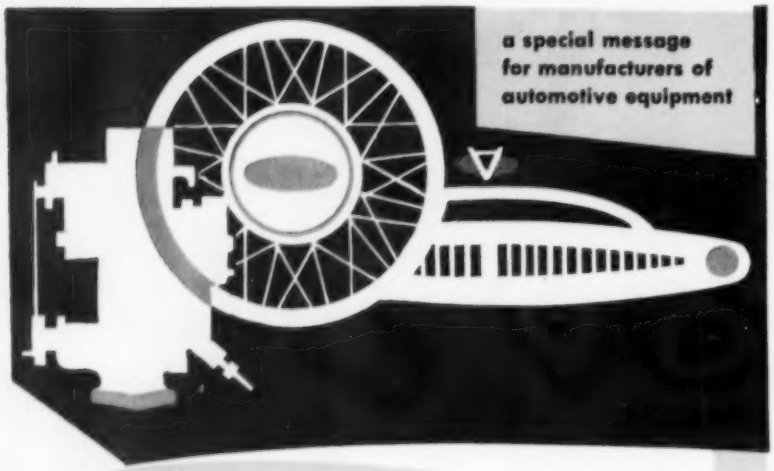

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Personals

John H. Poulson, Ogunquit, Maine, has been appointed regional manager for All-State Welding Alloys Co., Inc., to cover the New England states and eastern New York state exclusive of the metropolitan area. Announcement of his appointment was made by **T. D. Nast,** president, at the company's offices, White Plains, N. Y.

For his new tasks, Poulson is particularly well-equipped by training and experience. After graduating from Brown University (AB degree) he studied Metallography and Welding, and in the U. S. Navy (1940–45) was a supervisor and instructor in these subjects. Throughout the ten years since World War II he has continued his work in the supervision, management and promotion of welding with particular emphasis on the utilization of specialty alloys.

Poulson is a member of the American Welding Society and is well-known as a speaker at AWS meetings and at meetings of the American Society of Tool Engineers.

Richard T. Crumley has been named sales manager of Toledo Porcelain Enamel Products Company, Toledo, Ohio, manufacturers of porcelain enamel products, it has been announced by **Sylvan F. Chappuis,** president.

Associated with Toledo Porcelain Enamel for one year and a half, Crumley was formerly with Toledo Mirror and Glass, and Underwood Corporation. He graduated from the University of Toledo and also attended Ohio University, and he served in the Armed Forces for three years.

Toledo Porcelain Enamel Products Company is a wholly-owned subsidiary of the Bettinger Corporation, of Waltham, Mass., and has participated in the product development which has made Bettinger a leader in the porcelain enamel field. Among the products which the company manufactures are high temperature ceramic coatings for aircraft and industrial parts subject to extreme temperature and corrosion, and V-Corr, a corrugated enamel-on-steel roofing and siding material which offers complete protection against fire, corrosive gases and the elements.

Appointment of **Charles A. Maloney, Jr.** to handle government and sub-contract sales of the Fielden Instrument Division of Robertshaw-Fulton Controls Company was announced by **Ralph M. Stotsenburg,** division sales manager.

The division, which is located in Philadelphia, manufactures electronic and electro-mechanical instrumentation for industry and the armed forces.

Maloney has served with the Army Signal Corps and a number of companies in the Philadelphia area. He was graduated from Lafayette College.

A COMPLETE RECTIFIER LINE . . . FROM 25 to 50,000 AMPERES

Clinton F. Ivins, Jr., has been appointed assistant manager of electrical sales at Hanson-Van Winkle-Munning Co., according to an announcement made by the company. Ivins will be particularly concerned with the marketing of low voltage rectifiers and will have general responsibilities in the entire electrical sales program, under electrical sales manager **P. Ross Lyons.**

Ivins

Prior to joining H-VW-M at the end of last year as an electrical sales engineer, Ivins was associated with the Keuffel & Esser Co. as an assistant to the vice-president. Before that he was with the Public Service Electric & Gas Co. of New Jersey as an industrial power sales engineer.

Ivins received his B.S. in engineering at Princeton in 1943 and did graduate work in electrical engineering at Harvard and M.I.T. After the war he attended the Graduate School of Business Administration at New York University. He is a member of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers.

F. P. Wilson, Jr., manager of the materials and processes laboratory, announces the appointment of **Dr. Wen Hsiang Chang,** formerly of Hunan, China, who recently joined the materials and processes laboratory of the General Electric Company's Large Steam Turbine-Generator department, Schenectady, N. Y., as an applied research engineer. He is currently studying brazing filler metals for elevated temperature service, and the effects of ultrasonics on brazed joints.

Dr. Chang received his Ph.D. Degree from Rensselaer Polytechnic Institute, Troy, N. Y., last February. He received his Bachelor of Science Degree in Metallurgy from National Hunan University, China, in 1946 and his Master's Degree in Metallurgy from the Missouri School of Mines, Rolla, Mo., in 1950.

He is a member of Sigma Xi; Phi Lambda Epsilon; the American Society of Metals; the American Welding Society; and the British Institute of Metals.

W. D. Kleppinger, formerly general manager of the chemical equipment division, has been elected vice-president of this division by the General Ceramics Corporation; it was announced by **Henry Arnhold,** president.

In addition to Chemical Stoneware, Impervious Graphite and other industrial ceramics products, Kleppinger's department now produces Pyrotone Welding Rings and Porcelain Enamel Coatings for steel, aluminum and other metals.

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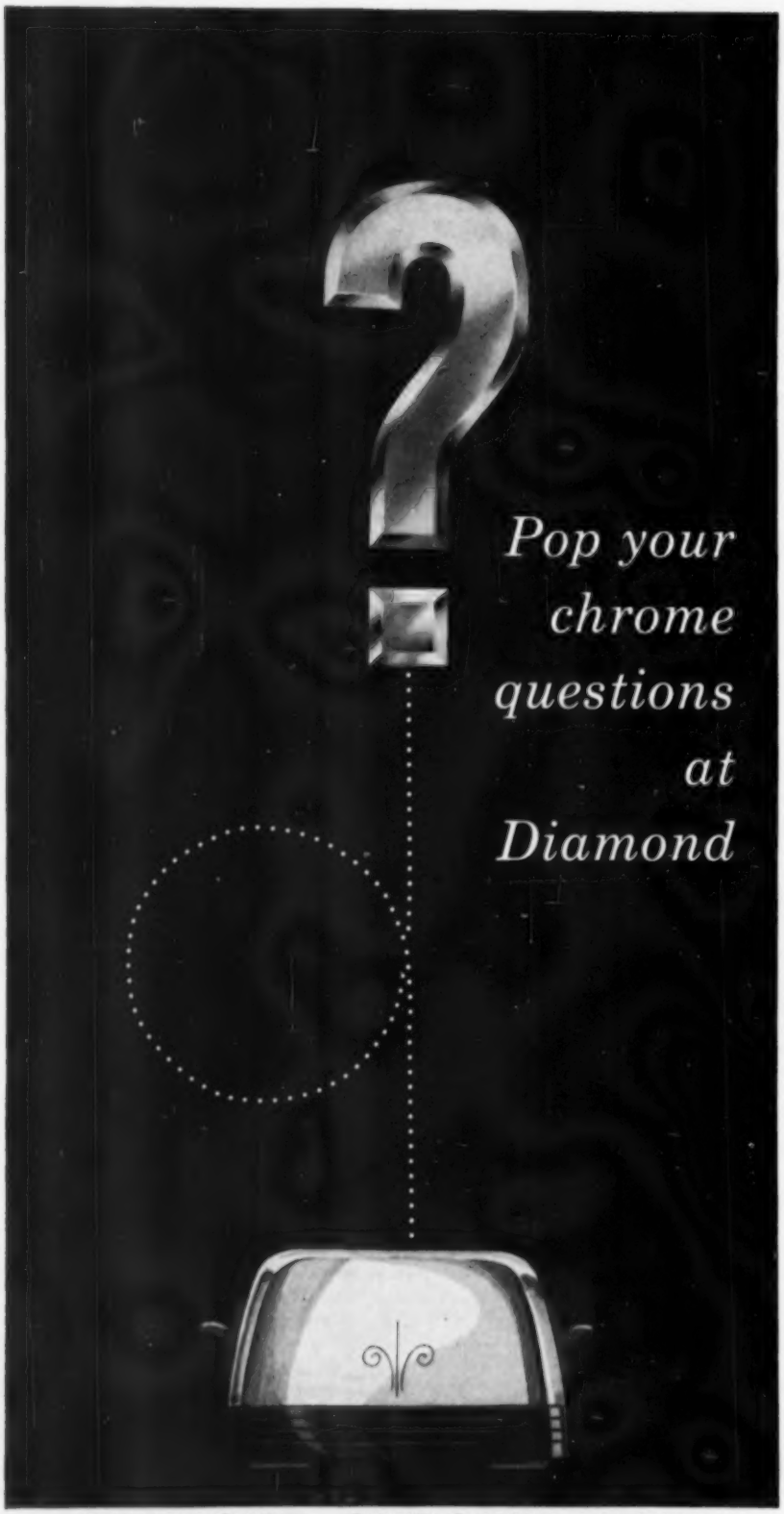

DIAMOND CHROMIC ACID

Here at DIAMOND we are all set to pop up with answers to almost any question about chrome plating that comes along. Our Chromium Chemicals Division has experts that do nothing else. And they do it without charge.

Our technical background comes from broad experience. We are in the chrome business up to our ears. For instance, we import the ore, make the soda ash and from there on, control every process in the making of DIAMOND chromic acid . . . extra assurance of uniform quality that helps you to get more uniform, more profitable results.

Nine warehousing points and nine sales offices spread across the country assure you fast service and uninterrupted supply. DIAMOND ALKALI CO., 300 Union Commerce Bldg., Cleveland 14, Ohio.

DIAMOND ALKALI CHEMICALS ®

Personals

J. A. Cairns has been appointed sales manager of Allied Research Sales Corporation, Baltimore, Md., it has been announced by **L. C. Kingsbury,** vice-president-in-charge-of-sales. Allied Research Sales Corporation is the marketing subsidiary of Allied Research Products Inc., manufacturers of the Iridite line of chromate conversion coatings for non-ferrous metals and ARP plating chemicals.

Cairns holds a degree in Chemical Engineering from the Drexel Institute of Technology and is a member of the American Electroplaters' Society and the American Society for Metals.

C. S. Wiedman, product and process development engineer, Carboloy Department of General Electric Company, Detroit, has been appointed manager of carbide products development engineering. In his new post, he will be responsible for directing the metallurgical development of carbide materials and related processes.

A native of Buffalo, N. Y., Wiedman joined General Electric Company in 1947, completing the company's chemical and metallurgical training program in 1948. He joined Carboloy Department shortly thereafter.

Wiedman holds a Bachelor of Science degree in metallurgical engineering from the University of Michigan. He also is a member of the American Institute of Mining Engineers.

Raymond F. Stevens has joined Acheson Colloids Company, Port Huron, Mich., as research chemist. Stevens will supervise the expanding basic research program of Acheson's laboratories, under the direction of **Dr. Harold J. Dawe,** director of research and development.

Stevens

Stevens came to Acheson after six years with the National Resources Research Institute of the University of Wyoming, where as a Fellow, he conducted research in hydrocarbon and coal chemistry, partly financed by a grant from the Research Corporation of America.

Graduating from the University of Denver with a Bachelor of Science degree in 1945 and from the University of Wyoming with a Masters' degree in 1948, Stevens is now working on his Ph.D. He is a member of the American Chemical Society, and the Colorado-Wyoming Academy of Science.

Harvey N. Barrett, Jr., v. p., sales, Basic Refractories, Inc., has announced the appointment of **Ralph E. Forsman** to the company's sales staff. Forsman will be located in the Philadelphia office to meet growing demands of the steel industry in that area for granular basic refractories manufactured by the firm.

Forsman

Forsman has a broad background of experience gained over a period of twenty years in the steel industry. Prior to joining the company he was associated with Youngstown Sheet & Tube Co. in East Chicago; Pittsburgh Crucible Steel Co. in Midland, Pa.; and Sharon Steel Co. in Lowellville, Ohio. During this period Forsman worked as a melter on open hearth and electric steelmaking furnaces.

H. E. Rittenhouse, a Fort Wayne, Ind., consulting engineer, has been named chief engineer of Rockwell Manufacturing Company's Pittsburgh Division.

Pittenhouse

He succeeds **Paul Mankin,** who was promoted to general manager of the division early this year.

A native of Phoenix, Arizona, and long time resident of Fort Wayne, Rittenhouse began his career as a draftsman for the Tokheim Corporation, Fort Wayne pump manufacturers.

After eight years with Tokheim, he joined the engineering department of Wayne Pump Company and later was named assistant manager of the aviation department. Since 1948, he has been affiliated with a Fort Wayne consulting engineering concern.

SAFE for all baths

With Unichrome Coating 218X, plating and anodizing racks are fitted for long use. Leading bright nickel producers have approved this green plastisol because of its chemical inertness. Well known plants are cutting costs with it. It's one of the most widely used coatings in the industry.

Justly so. Coating 218X resists severest plating and cleaning baths, even vapor degreasing cycles. It rinses freely, sticks tight to contacts, won't chip, crack or blister.

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THE FINISHING TOUCH

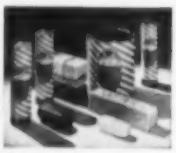
CUSTOMERS DEMAND AND GET MORE "CUT" IN COMPOSITIONS

by D. J. Swanberg
Sales Manager—Stevens Compositions

Fast cutting grades of compositions are more and more in demand. That is why Frederic B. Stevens, Inc. has developed several new compositions that have met with enthusiastic approval by our customers.

Stevens 5-L Liquid Tripoli is fast cutting and the color obtained is excellent. This composition is formulated with a wheel adhering medium-heavy viscosity of 30,000-40,000 centipoises.

Two other Stevens compositions on the "Hit Parade" are Stevens 4-L Liquid Nickel Buffing Composition and Stevens 4-L Liquid Die Cast Tripoli. The increasing number of new customers is indicative of the success of these Stevens products. In many cases 4-L Liquid Nickel Buffing Compound is supplanting cake lime. It does an excellent cut and coloring job on nickel plate. 4-L fits nicely into the ever-growing demand for die-casting finishing.



For special size machine cake applications on any non-ferrous metal Stevens 44 Tripoli is our latest offering. It has a strong texture and a medium-high melting point. It has more cut, along

with excellent coloring. Better still, the price is right. Repeat orders from big customers tell the story.

For final coloring of brass we recently introduced new Stevens 482 white rouge. It gives equal coloring results of red rouge but, of course, has the advantage of eliminating the discoloration of shop and clothing.

With new model products of every kind high in use of decorative trim and hardware—with the increasing use of zinc and aluminum die castings as well as stainless steel—manufacturers are searching for new, better and faster finishing compositions. If you have a finishing problem why not let us make recommendations after an L.V.* Report. No obligation, of course. Write today for further details.

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STEVENS
INCORPORATED
YOUR METAL FINISHING SUPERMARKET
DETROIT 16, MICHIGAN

Personals

In order to keep pace with the operations of the recently expanded Hanlon-Gregory Galvanizing Company plant, **A. J. Diebold,** president, announces the following executive changes:

Vice-president **William H. McKenna** is named vice-president in charge of sales, and will direct all the firm's marketing operations.

Gregory

McKenna

Thomas Raymond Gregory, until recently manager of the Thomas Gregory Galvanizing Works, Maspeth, N. Y. (no corporate connection with Hanlon-Gregory) has been named vice-president in charge of production.

Lawrence Nipp, formerly assistant superintendent and a veteran of 16 years with the company, has been made superintendent. Former superintendent **Henry Volker,** who has been with the company 30 years will continue with the firm in a consulting capacity.

H. Zane Schofield has been appointed supervisor of the ceramics section in the ceramics and minerals research department at Armour Research Foundation of Illinois Institute of Technology, Chicago.

Schofield was employed by Battelle Memorial institute, Columbus, O. for more than 10 years before joining the Foundation as acting supervisor earlier this year.

He served as a consultant at Battelle, promoting, planning, supervising, and reporting basic and applied research in most branches of conventional and special ceramics and cermets.

Schofield is co-holder of two patents—high temperature vitreous ceramic coating material and a composite refractory material for steel making.

A ceramic engineer, he received his educational training at Ohio state university.

Schofield is the author of a number of articles on ceramics. A registered professional engineer in the state of Ohio, he is a Fellow in the American Ceramic Society and also belongs to Keramos, Sigma Xi, National Institute of Ceramic Engineers, and the British Ceramic Society.

Robert C. McDowell, president, has announced the appointment of **Thomas E. Ban** to the post of director of research for McDowell Company, Inc.

As McDowell's director of research, Ban will head a completely integrated industrial laboratory covering the field of minerals processing, including waste by-products recovery, ferrous and non-ferrous ore beneficiation, lightweight aggregate development, and cement making processes, McDowell said.

Theodore L. Funk has been named assistant chief engineer of McDowell

Ban

Funk

Company, Inc., Robert C. McDowell, president, also announced.

Prior to joining McDowell, he was for a number of years associated with Jones and Laughlin Steel Corporation, serving in various capacities including that of resident engineer of the firm's Cleveland works.

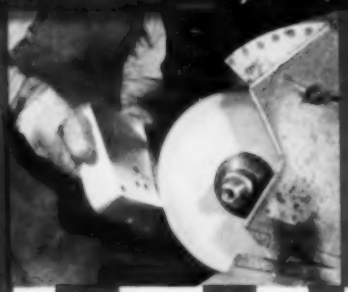
He is recognized as a specialist in matters dealing with mechanical processes and all steel-making equipment, including blast furnaces.

Funk is a member of the Cleveland Engineering Society, Cleveland Chamber of Commerce, River Dredging Committee, River and Harbor Committee, and an associate member of the A.I.S.E.

The Bradley Paint Company, Los Angeles, Cal. takes pleasure in announcing the appointment of **Arnold J. Tuckerman** as technical director of its ordnance and industrial metal finishes division.

Tuckerman received his BS degree in chemistry at Pennsylvania State College in 1936 followed by his Masters degree two years later. He comes to Bradley Paint Company after 15 years at the Pitman Dunn Laboratories, Frankford Arsenal, Philadelphia, where he has been serving as chief of the Polymer Branch in charge of the Research and Development of organic coatings as used by government installations and private industrial plants.

Tuckerman is a member of the American Chemical Society, the Federation of Paint and Varnish Production Clubs, the R.E.S.A. and the Society of the Gallows Bird. He has served on Committee D-1, A.S.T.M. and the Surface Preservation Committee of the American Ordnance Association.



LEA Compound

LEA

Learok

LEA Liquabrade

THE FIGHTIN'EST TEAM IN THE FINISHING FIELD

Like Athos, Porthos and Aramis of Dumas' imagination, these three Lea Musketeers for years have fought the battle for economical and quality surface finishing. They've taken on all comers. Whether for the final finish or intermediate preparation for plating, one or more of these compounds can be found in most plants where low overall finishing costs combined with quality finishing are the objectives.

● **LEA COMPOUND** is industry's pioneering *greaseless* composition. Introduced in the 20's, it's the leader today and is available in many kinds and sizes of abrasive grains. It's the ideal composition for producing satin finishes or for flexible polishing and burring on stainless as well as silver, brass, aluminum and other non-ferrous products.

● **LEAROK** complements LEA Compound. It's industry's pioneering and today's leading "no-free-grease" composition. With no tendency to pack, therefore clean, it long ago proved a boon to plants finishing articles with crevices and contours.

● **LEA LIQUABRADE** . . . a post-war development by the Lea Technical Staff, is fast establishing its superiority and preference in many plants, particularly where production line automatic methods of finishing are set up. Stable, non-settling, completely non-flammable and non-explosive, it is being bought by many large companies in trailer lots. Like the other Lea compositions, LIQUABRADE comes in a wide variety of types and sizes of abrasive grains.

While this particular message is on these three outstanding Lea Finishing Compositions, don't forget Lea Technical Service. We're at your service in connection with any surface finishing problem you may have. We have complete laboratory facilities to do any necessary test work. We can help correct wrong methods now being used and help start you out right on new products.

Burring, Buffing, Polishing, Lapping, Plating and Spray Finishing . . . Manufacturers and Specialists in the Development of Production Methods, Equipment and Compositions. Manufacturers of Lea Compound and Learok . . . Industry's quality buffing and polishing compounds for over 30 years.

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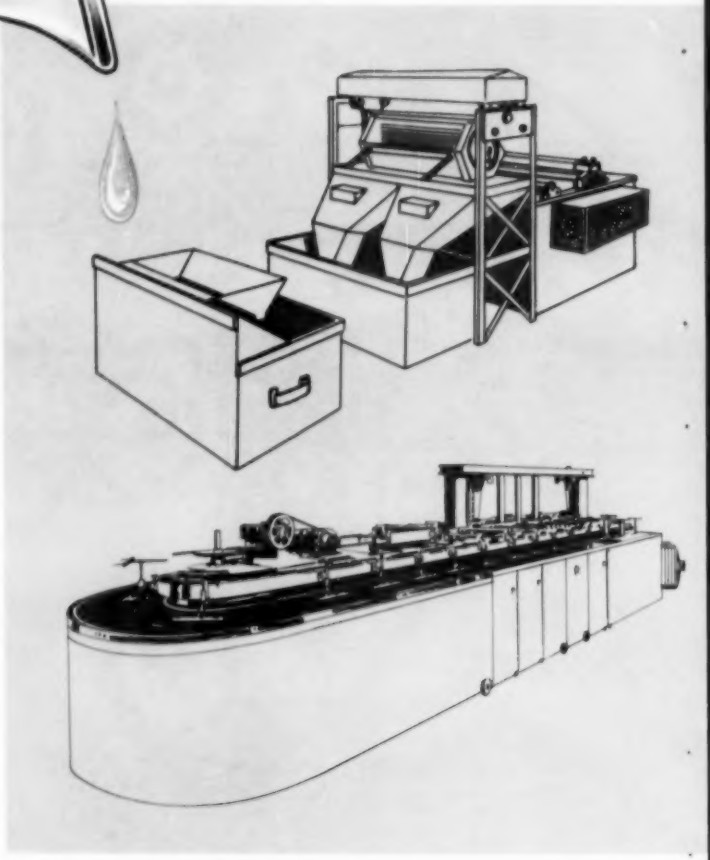
SUPERTARTRAL*

. . . looking for improved results from your cyanide copper solution?



SUPERTARTRAL, industry's proved replacement for Rochelle Salts and Potassium Tartrate in *any* cyanide copper plating operation, offers the following advantages:

SUPERIOR Anode Corrosion, making maximum use of plating metal.

SUPERIOR Tolerance to numerous metallic impurities such as Chromium, Calcium, Barium, Magnesium, etc.

SUPERIOR Deposits with less tendency for roughness, caused by metallic impurities such as might be introduced with hard water.

SUPERIOR Cost Savings when used at recommended concentration; where operating characteristics of standard and bright baths utilize Rochelle Salts at 6 oz./gal., SUPERTARTRAL offers 20% savings over Rochelle Salts and 23% saving over Potassium Tartrate.

SUPERIOR Cyanide Stability . . . Lea-Ronal SUPERTARTRAL reduces cyanide breakdown with its resultant carbonate formation.

SUPERTARTRAL has been thoroughly and successfully production tested in still tank and barrel installations of conventional and bright cyanide copper processes, including the widely used Lea-Ronal Bright Copper Process.

LEA-RONAL Products are the result of careful research and development which guarantees that they are not put on the market until ready.

Your constant search for improving plating operations and for lowering costs, warrants thorough investigation and trial of LEA-RONAL SUPERTARTRAL.

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*Trade Mark Applied for Patents and Patent Pending

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Are you interested in Plating Specialties? SEE THE OTHER SIDE OF THIS INSERT.

REPORTS from all over

. . . stripped, cleaned and degreased

(This section is especially compiled for the readers of PLATING; here the world in which we work and operate is stripped of its veneer, cleansed of its distortions and carefully degreased of superfluities).

It is a fair expectation and most authorities seem agreed that the economy's record level is more than a passing stage. It is here to stay for a long time. There is nothing in the whole outlook to suggest any sudden reversal of the economy's expansion. In the coming months, the pace will be slower, however.

Quotations on all metals quoted.	
ALUMINUM—(99 per cent pure plus ingot)	24.333
ANTIMONY—Five tons or more but less than carload	34.137
Bulk	30.667
In cases (Port Laredo)	31.167
CADMIUM—Producers' quotation	170.000
Producers' and platers' quotation	170.000
Platers' quotation	170.000
COPPER—Electrolytic, domestic	38.150
Electrolytic, export	40.000
GOLD—(per ounce U. S. price)	$35.000
LEAD—Common, New York	15.000
Common, St. Louis	14.800
MAGNESIUM—(ingot)	30.574
MERCURY—(per 76 lb flask)	$253.889
NICKEL—(F.O.B. Port Colborne U. S. duty included)	64.500
PLATINUM—(refined per oz)	$84.000
SILVER—New York, per/ounce	90.750
London, pence/oz	79.119
TIN—New York	96.458
New York, 99 per cent min	95.458
ZINC—Prime Western (E St. L.)	12.500
Prime Western (delivered)	13.000

CERAMICS AND PAINTS—The porcelain-enameled aluminum foil introduced by *Ferro Corp.* is expected to replace eventually mirror walls (a porcelain enamel on steel used in building) because of its greater pliability and rustproofness. Adhesive-backed, it can be applied like wallpaper. . . . A water bath using infrared heat is claimed by *Chicago Apparatus* to maintain a constant temp within 0.001 C. . . . Glass-enameled steel equipment: German firm claims its acid-resisting glasses are ordinarily resistant to acid attack up to 350 C. A new enamel (EG54) is claimed to overcome the disadvantage of brittleness of the previous enamel used, to have impact resistant 4 times as great as normal enamels, to give a surface stable to shock cooling from 350 C to room temp, and free from crazing on repeated temp cycles to intermediate temps. . . . A copper-impregnated baked-on finish is claimed by *Servel Inc.*, to give housewives the same copper-like refrigerator doors but to be about 50 per cent cheaper than the previous finish used. . . . Alkyd resins made from isophthalic acid are available in limited amounts from *Reichhold Chem. Inc.* These new resins are expected to yield paints with greater exterior durability which will dry faster and have more flexible films while having less tendency to "skin dry." Of 3-Super Beckosol experimental resins, available for evaluation and development, 1 is a very-long-oil and the 2nd is a long-oil, and the 3rd is a short-oil. Baked primary auto finishes containing this new short-oil alkyd were said to have shown rapid curing properties and to have good gloss retention. . . . A room-temp-drying auto paint (Arco-45), by *Arco Div.*, may allow dealers or distributors to paint cars just before delivery. Tested for over 1 yr, it is said to be a high-luster enamel which sets, dust free, in 15 min, and dries completely in 45. It is said to cover more area than conventional enamels—about $1/gal.

METALS—Metal markers using electrolytic action to mark finished metal surfaces are claimed by *Lectroetch Co.*, to be used safely even on precise and delicate parts since only a light contact is needed between the cartridge stencil and the part. . . . New ion exchange resin, developed at *Brooklyn Poly* is said to be resistant to acids, and to have specific affinity for heavy metals. This polythiolstyrene looks promising for recovering mercury, copper, silver, and gold from dilute solns. . . . Polythiolstyrene: a new oxidation-reduction ion exchange resin—it is highly specific towards metals which form mercaptides.

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Specifications for:

A 164–53.	Electrodeposited Coatings of Zinc on Steel
A 165–53.	Electrodeposited Coatings of Cadmium on Steel
A 166–53 T.	Electrodeposited Coatings of Nickel and Chromium on Steel (Tentative)
B 141–45.	Electrodeposited Coatings of Nickel and Chromium on Copper and Copper-Base Alloys
B 142–53.	Electrodeposited Coatings of Nickel and Chromium on Zinc and Zinc-Base Alloys
B 200–53 T.	Electrodeposited Coatings of Lead on Steel (Tentative)
B 201–49 T.	Chromate Finishes on Electrodeposited Zinc, Hot-Dipped Galvanized, and Zinc Die-Cast Surfaces (Tentative)

Methods of:

A 219–51 T.	Local Thickness of Electrodeposited Coatings, Test for (Tentative)
B 117–49 T.	Salt Spray (Fog) Testing (Tentative)

Recommended Practices for:

B 177–49.	Chromium Plating on Steel for Engineering Use
B 183–49.	Low-Carbon Steel for Electroplating, Preparation of
B 242–53.	High-Carbon Steel for Electroplating, Preparation of
B 252–53.	Zinc-Base Die Castings for Electroplating, Preparation of
B 253–53.	Aluminum Alloys, Preparation of and Electroplating on
B 254–53.	Stainless Steel, Preparation of and Electroplating on
B 281–53 T.	Copper and Copper-Base Alloys for Electroplating, Preparation of (Tentative)

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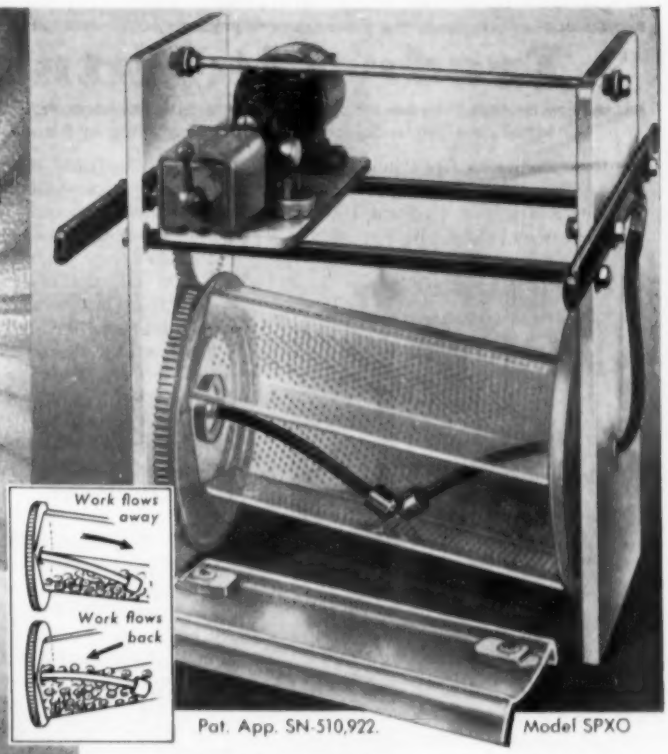


Pat. App. SN-510,922. Model SPXO

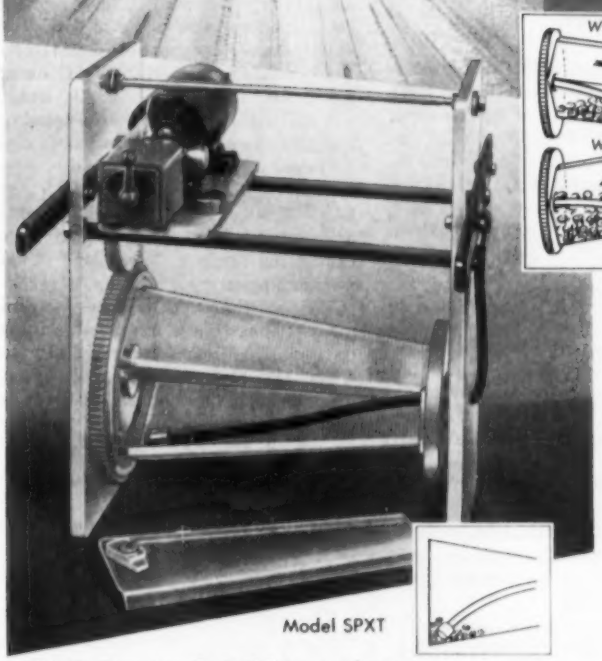
BELKE Double Oscillating Cylinder

Affords uniformity of deposit never before obtainable in barrel plating.

Eccentrically mounted cylinder oscillates as it rotates. Moves the work back and forth *across* the cylinder. No parts remain shielded by cylinder ends. All parts exposed for plating so uniform you can deposit specified thickness in a fraction of the time formerly required.

A tremendous money saver for all barrel plating. An absolute must for washers and flat pieces that tend to stick together.

All sizes from 14 x 30 regulars to 6 x 12 portables.



Model SPXT

BELKE Tapered Odd-Lot Plater

Plates from a few pieces to full capacity

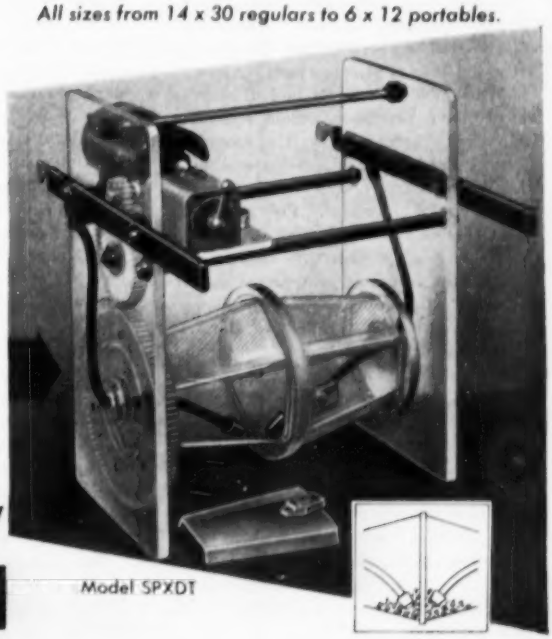
Eliminates costly hand wiring *heretofore unavoidable in plating small quantities.*

Tapered Lucite cylinder *piles the work at the deep end around the ball contact.* Assures uniform plating of any quantity from a few pieces to a full load.

BELKE Double Tapered Odd-Lot Plater

Plates odd lots of two kinds of work.

Double tapered, two-compartment Lucite cylinder piles each kind of work around a ball contact. *Assures uniform plating in each compartment of any quantity from a few pieces to a full load.*



Model SPXDT

Belke Manufacturing Company
947 N. Cicero Ave., Chicago 51

EVERYTHING FOR PLATING PLANTS

Trade Literature

Please use Reader Service Card to obtain any item in this section

L—1000. 3-Part Utility Folder—A new 3-part utility folder designed for the metal finishing and plating department is now available from Frederic B. Stevens, Inc.

The new folder can be used for three important purposes: A stock record to help plants check their finishing supplies inventory; an emergency First Aid wall chart outlining treatment for plating room accidents; or a file folder to file technical bulletins and sales literature supplied by supplier sales engineers.

All future requests for Stevens sales bulletins will be mailed in one of these utility file folders.

L—1001. Verification Literature—The Customer Service Laboratory of the Metal Finishing Division, Frederick B. Stevens, Inc., reports a recent noticeable increase in the requests for L.V. (Laboratory-Verified) Reports concerned with the surface finishing of stainless steel.

When polished and/or buffed, stainless steels have utmost corrosion resistance. However, there are also the factors of greater hardness and abrasion resistance, less thermal conductivity, and a greater coefficient of expansion. This means the type of buffs, the wheel speeds, the applied pressure of work against the buff and the compositions used are of extreme importance if the finisher is to avoid the dangers of discoloration, distortion or warping.

By making hundreds of tests and supplying L.V. Reports to leading manufacturers, techniques have been developed by Stevens to help cut costs and improve stainless steel finishes for many manufacturers.

Several of these L.V. Reports are condensed in the new Stevens Technical Bulletin PP-124 "*Successful Stevens L.V. Finishing of Stainless Steel*". Finishing methods and procedures are included for cutlery, automotive moldings, cooking ware plus many other items.

L—1002. pH Guide—Users of industrial pH instrumentation will find it much simpler to match components such as meters, flow or immersion assemblies, electrodes and manual or automatic electrode switches with the new Industrial pH Buyer's Guide now available from Beckman Instruments, Inc.

The four-page illustrated guide shows pictorially which components replace older units and how older and newer components can be used together. It also includes a cross-reference chart to simplify electrode selection and tells exactly how to order pH equipment.

L—1003. Dip Coating With Chem-O Sols. Chemical Products Corporation, East Providence, R. I., has just issued a new instruction bulletin telling how to dip coat and improve products with chem-o-sol, a plastisol formulation. The bulletin is largely technical, giving temperatures and heating periods for sample applications. Also included is a discussion of dip coating chem-o-sols with and without pre-heating.

L—1004. Equipment Guide—Maintenance painters can quickly find the answers about the proper equipment for specific spray painting jobs in a new equipment guide published by the DeVilbiss Company, Toledo, O., manufacturers of spray painting equipment.

The catalog covers complete spray painting outfits, the individual components and guides which show the correct gun and nozzle combinations to use with all types of commercial materials.

The booklet is arranged to give maximum information quickly to guide maintenance painters in buying and using equipment.

DeVilbiss, recognizing the need for this type of publication, has incorporated information based on extensive studies made in the field and in the laboratory. The outfits, described in the booklet, are made of matched units to achieve top quality results along with speed and efficiency of operation.

L—1005. New News Bulletin—Doerr Glass News, the first in a series of news type bulletins devoted to scientific laboratory glassware, has been published by Doerr Glass Company, Vineland, N. J.

The bulletin featuring a newspaper format, is designed to acquaint users and dealers with the newest developments in the scientific laboratory glassware field.

The feature story in the current issue concerns the AIR-PAK packaging program which Doerr Glass Company is building into a 1955 Fall campaign.

L—1006. Anti-Corrosion Coatings—A 19 page report on "Comparative Properties of Protective Coatings" by Gerald F. Gilbert, Jr., has been made available by The Atlas Mineral Products Co., Mertztown, Pa. The report contains information on 14 types of coatings used widely to protect equipment, walls, beams and ceilings in plants where fumes and industrial atmospheres cause corrosion. Included in the report is physical and chemical data and a three page section on the selection of coatings. A chart in the presentation shows comparative value of the various coatings as protection against weather, impact, abrasion, heat, water and various chemical groupings.

L—1007. Chlorinated Solvents—A factual, 14-page technical bulletin concisely reviewing its complete line of specialized chlorinated solvents has been issued by the Chlorinated Products Division of Diamond Alkali Company, Cleveland, O., and is now being distributed among chemical research, processing, purchasing, and other interested executives.

Products discussed in the bulletin, entitled "Diamond Chlorinated Solvents," are methyl chloride, methylene chloride, chloroform, carbon tetrachloride, and perchlorethylene.

The bulletin presents, in easy-to-read, quick-reference digest form, basic data on each product—description, physical properties, typical shipping analysis, major uses, handling precautions, and size of containers for shipment.

L—1008. Crack-Free Chromium—The United Chromium Division of Metal & Thermit Corporation has just published a four page bulletin, CFC-1, describing its new Unichrome Crack-Free Chromium plating process.

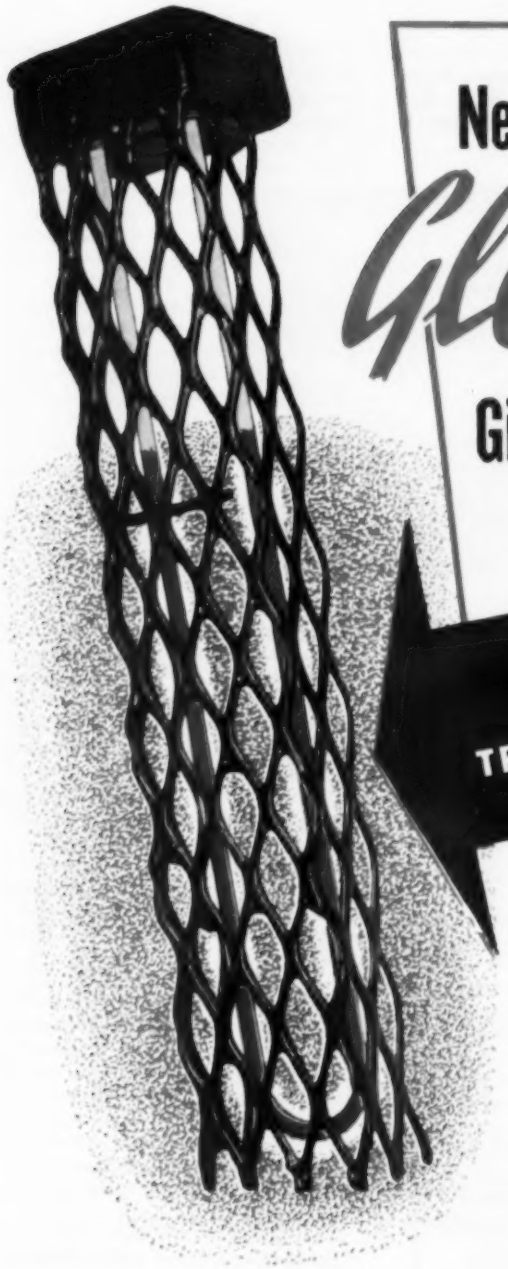
This bulletin outlines the advantages of this new process with emphasis on the superior corrosion resistance and buffability of the deposit.

The bulletin is illustrated with comparative cross-sectional and surface views of Unichrome Crack-Free Chromium and ordinary chromium together with photos of various applications.

In addition to the physical advantages there is also information on the ease of make-up and maintenance of the plating solution.

L—1009. Proper Painting On Repainting Transformers—"Repainting Transformers in the Field" is the title of G-E bulletin GET-677F now available from the General Electric Company, Schenectady, N. Y.

The eight-page publication is profusely illustrated and includes a discussion of proper painting methods for longer paint life, preparation of paint, number of coats required, and has a discussion of repainting subway transformers.



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Trade Literature

L—1010. Sensitive Thermocouples and Control Valve Line—The Industrial Division of Minneapolis-Honeywell Regulator offers two new specification sheets. Specification Sheet 57 describes new two-wire thermocouples, with outside diameters of 1/8 inch and 3/16 inch. These are for use where sensitivity and accuracy are important, and where space is limited. They are available in lengths from six to 72 inches, and can be furnished with small open terminal block assembly, general purpose head, or screw cover terminal head assembly.

Specification Sheet 429 covers a new line of Honeywell diaphragm control valves, designated "Series 400." Data include actuator and body specifications, flow characteristics and complete dimensions for the double-seated, single-seated and three-way types which comprise the new line.

L—1011. "A Better Bond . . . For Organic Finishes"—is the title of a four-page pamphlet recently issued by Turco Products, Inc., manufacturers of specialized industrial chemical processing compounds. The folder describes in detail the complete Turcoat line of phosphating compounds.

In addition to a general discussion of phosphating, metal treatment prior to painting and metal treatment prior to other organic finishing, the brochure includes a "Phosphating Reference Chart." This chart outlines the purpose of each Turcoat material, the recommended uses, Government specifications met, methods of application, equipment requirements, metals to be used on, coating weights and complete operation cycle. Turcoat materials discussed in the folder include:

Turcoat 3540—Produces a thin, smooth, tight phosphate coating as a bond for paint. Recommended for fabricated parts; auto body parts; sheet steel components, refrigerator, heater and washing machine parts; metal drawing, projectiles, bombs and mines.

Turcoat 3520—Produces a substantial phosphate coating as foundation for oil, paint or other organic finishes. Recommended for stampings, bolts, hardware tools, auto accessories and structural parts.

Turcoat 3557—Highly versatile material which produces antifriction coating and foundation for paint . . . substantial phosphate coating for moving parts, metal drawing and under oil or paint. Excellent for use in tumbling operations or other mass production methods. Recommended for use on pistons, gears, crankshafts, ordnance parts, clips, tank parts.

Turcoat 3420—For cleaning, conditioning, passivating and depositing a light phosphate coating on metal surfaces. Excellent for use on sheet steel components, cabinets, heaters, structural parts, aluminum awnings, venetian blinds.

Turco W. O. No. 1—For rust removal and metal conditioning prior to painting. Recommended for use on auto bodies, fenders, sheet steel components.

Turcoat 3560—Produces a chemical coating as a bond for paint on terne plate or other difficult-to-coat non-ferrous metals.

L—1012. Oakite Rustripper. Alkaline Stripper for Rust, Paint, Phosphate Coatings—A new method of removing paint, phosphate coatings, rust, and oil from metal surfaces—a method that is said to eliminate as many as six operations—is described in a folder recently published by Oakite Products, Inc., manufacturers of industrial cleaning and metal finishing compounds.

The folder discusses Oakite Rustripper, a new alkaline detergent which, the manufacturers claim, simultaneously removes rust and grease from new products; rust, paint and phosphate coatings from rejects and from used products which are to be refinished. The folder tells how Oakite Rustripper can eliminate such operations as pickling, vapor degreasing, and wire brushing.

L—1013. Sel-Rex Bright Rhodium Literature—An illustrated 4-page technical information bulletin describing the Sel-Rex Bright Rhodium Process, has just been completed by Sel-Rex Precious Metals, Inc., of Belleville, N. J.

The new literature contains such information as bath preparation and control, operating conditions, equipment requirements, determination of rhodium in plat-

COVER STORY . . . STRIP TEASE

Industries have a way of spilling over into each other. With every new advance made by science in one field a vast new panorama may open in other fields. It was inevitable that the plastics industry should affect the paint manufacturers and vice versa.

Man has devised many means for fighting corrosion, for its prevention, for its retardation. Plating is one means. Paint is another whereby protection has been embellished to bring decorative beauty to our products.

During World War II fighter planes had to be carried overseas. Bombers could be flown to their destination, but fighters had to go as deck freight. The same was true of ordnance pieces which had to be delivered to distant places over water. What happened to engines and gun barrels during such trips was nothing less than total loss when we consider that their only value lay in immediate use on arrival.

Industry came to the rescue of American arms.

Complete airplanes and ordnance pieces were enclosed in plastic envelopes. These "cocoons," "mothballs," "envelopes" etc. are a polyvinyl plastic. These polyvinyls are largely cellulose acetate, ethyl cellulose, or cellulose acetobutyrate.

These temporary coatings, in addition to protecting the enclosed metal, also afford considerable protection from mechanical abuse. Then, when work has been completed (such as assembly) these coatings can be readily stripped off and the finished product is completely clear of scratches, oxidation, and all sorts of mechanical abuse. However, there is still another facet. It is the matter of delivering a product "factory fresh." The tantalizing expectancy which comes with removing strippable coatings seems to carry with it a fulfillment; a certain tickling of curiosity that must end in pleasurable satisfaction; a closeness developed between manufacturer and consumer. It's a real strip tease.

This month's cover picture shows a bit of coating being removed from the pristine purity, the whiteness of the coated paper we use. The drama lies more in the connotation than in the fact. And yet, this is perhaps the most titillating factor of strippable coatings, that they preserve the original, the basic, the newness, the finish—all at one and the same time.

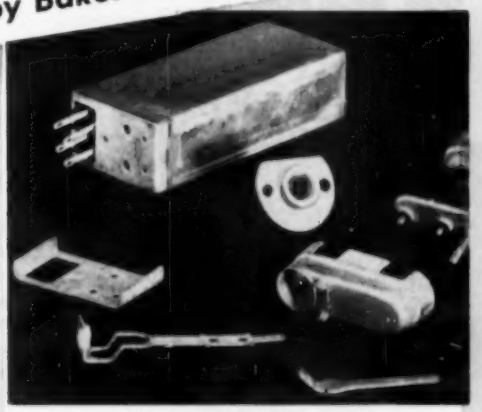
We are indebted to Better Finishes and Coatings of Newark, N. J. for the picture.

THE EDITOR

Improved Plating Techniques by Baker & Adamson

Vital Engine Parts Protected!

A harder coating, with better corrosion and wear resistance, is produced with a low tin-content B&A fluoborate bath for protecting bearings and other engine parts. Additional uses include depositing coatings on pistons and similar parts to provide marginal lubrication during break-in periods, electro-cladding wire and plating threaded parts for needed lubrication properties.



Soldering Made Easy!

A high-tin-content fluoborate bath produces coatings of excellent solderability on electronic or electrical parts where the use of a non-corrosive flux is desired. It also gives a uniform coating that expedites assembly, and where the parts can be fused, the B&A Fluoborate alloy bath can be used to deposit the solder, eliminating costly hand soldering.

NOW...You Can Plate CUSTOM-MADE Alloy Coatings

with B&A Lead and Tin Fluoborates!

These are high-speed, low-cost operations . . . short-cuts to producing better, more economical products.

The plated coatings shown are actually tailor-made to specific requirements with Baker & Adamson Lead and Tin Fluoborate Solutions. When protective and lubricating coatings are required, as in bearings, lead-tin alloys of low tin content are readily plated. Where a deposit of good solderability is desired, as in electronic parts, alloys with 40-60% tin content can be produced. B&A Lead and Tin Fluoborate Solutions, combined in a bath using alloy anodes, produce dense, fine-grained, uniform deposits with pre-determined characteristics. Send the coupon for detailed technical bulletins.

B&A Fluoborate Plating Chemicals Include:

Lead • Tin • Iron • Copper • Nickel • Cadmium
Indium • Antimony* • Chromium* • Cobalt*
Fluoboric Acid

*Experimental quantities only

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☐ Your Technical Bulletins No. TC38351, RA38351, and RB38351 on applications and techniques for plating lead and tin alloy coatings.

☐ Information on applications of other B&A Metal Fluoborates. Specify type _____

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IL-10

FROM RAINCAP TO HOOD

Specify PLA-TANK® for your DUCT SYSTEM

Illustrated above is part of a new PLA-TANK Duct System which is typical of dozens being installed for fume exhausts in plating rooms, maintenance shops and chemical processing plants. PLA-TANK was chosen for the entire system from hoods to raincaps on the outside stacks.

Included in the system (in addition to hoods, ducts, stacks and caps) are molded PLA-TANK fan housings and propeller-type fan blades. *Everything that contacts the fumes is molded of chemical-resistant PLA-TANK.*

PLA-TANK, molded from long-life, resin-bonded glass fibre laminate is resistant to a wide variety of fumes and temperatures. It is lightweight, easy to install, competitively priced.

PLA-TANK can be the answer to your duct system problem. Let us help you the modern way — with PLA-TANK.

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PLA-TANK, INC.

DIVISION OF

THE Chemical CORPORATION

Dept. 57 • West Warren, Massachusetts

Trade Literature

ing solution and a table listing the physical properties of rhodium.

Of special interest to readers not too familiar with electrodeposited rhodium, will be the section listing various specific industrial and decorative applications where an electrodeposit of this precious metal is producing incomparable results, economically.

Special charts have been designed as "inserts" for the Sel-Rex Bright Rhodium booklet, which clearly indicate length of time required to electrodeposit a specific thickness of rhodium at given current densities.

L—1014. Instruments for Surface Measurement—Instruments designed for the measurement of surface finish are illustrated and described in a new folder, now available from Brush Electronics Company, Cleveland, Ohio.

The free literature highlights the Brush Surfindicator, a versatile gauge for surface roughness measurement. The instrument is portable, inexpensive, easy to operate and adaptable to a wide range of applications.

The surface roughness range which can be measured extends from 1 to 1000 microinches arithmetic average deviation from the mean surface. Calibblock Precision Reference Specimens which are included, provide a simple and absolute calibration of the Surfindicator. Thus, the possibility of measurement errors between different instruments is eliminated.

L—1015. Electric Heating of Plating Solutions—A new 4-page bulletin illustrates and describes a wide range of electric heaters designed for the heating of cleaning, pickling and plating solutions. Types for mounting through tank walls, side arm mounting, various shapes of side hung immersion heaters and special applications of outside-wall clamp-on flat heaters are illustrated. Kilowatt ranges from 0.6 to 100 with a wide selection of corrosion-resisting sheath materials and automatic thermostatic controls are shown. Special features are overall acid-resistance, completely sealed, extra heavy moisture and shock-proof construction for rugged service requirements. Temperatures are accurately and automatically controlled with individual tank heaters and controls, permitting exact solution temperatures required for the wide working range of different plating operations. Also illustrates high-speed, far-infrared heaters for mechanized parts drying and radiant heaters for winter comfort heating.

L—1016. Vidigage Folder—A new 4-page folder on the "Vidigage" Ultrasonic resonance thickness gauge has been released by Branson Instruments, Inc. Operating principles, typical applications, and features are described in the folder.

The "Vidigage" measures thickness instantaneously from the side of the material under test. Thickness is read from the location of a bright vertical line on a 21-inch television tube. A wide choice of direct reading scales is available for thicknesses between 0.005 inch and 2.5 inch, with accuracies as high as 1/20 per cent. Large structures and remote locations may be tested by using extension cables, up to 1,000 feet long between the gauge and the small oscillator.

Applications include production thickness testing of aircraft propellers, milled aluminum plates, plate glass, tubular extrusions, centrifugal cast iron pipes, lead covered cables, and many other shapes and materials. Laminar discontinuities and lack of bond are rapidly detected.

L—1017. Temperature Control for Plating Tanks—Date Sheet 5.1-4 describes the application of Honeywell instrumentation to various types of plating tanks. Schematic diagrams of typical installations describe the use of electric and pneumatic temperature control systems, and of recording, indicating and nonindicating instruments.

L—1018. Booklet on Coloring Anodized Aluminum—The latest developments on coloring anodized aluminum have been compiled by Sandoz Chemical Works, Inc., and are now available in booklet form to the metal finishing industry and related trades, according to Max Gossweiler, Sales Manager, Aluminum Division.

This comprehensive booklet, offered as a service to the industry, refers to the following subjects: (1) Types of aluminum finishes possible and the versatility of anodizing methods. (2) Peculiarities of dyestuffs, their special properties and behavior patterns. (3) Choice of alloy in relation to the appearance of the finished product. (4) Surface preparation and the wide range of effects obtainable. (5) Anodizing conditions and their control for consistent results. (6) Sulfuric acid electrolyte and the specially selected dyes required. (8) Dyeing procedure and control methods with color chips of most-used colors.

The first fully automatic waste disposal system in the automobile industry for destroying cyanide and neutralizing acid-alkali waste is one of the items described in one of the group of article reprints offered by Frederic B. Stevens, Inc., leading designer and supplier of plating room and metal finishing waste disposal facilities.

Another article detailing helpful hints on cutting electroplating costs with proper waste disposal is also included.

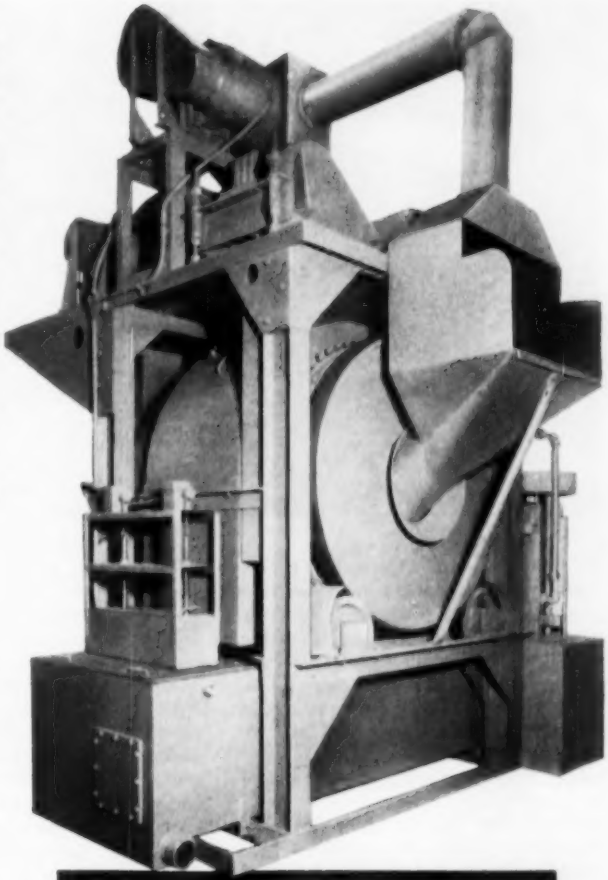
See this Ingenious RANSOMATIC "at work" at the Philadelphia Show

It was built for The Thomas & Betts Co., Elizabeth, N.J., for adding additional corrosion protection to electrical fittings. Basically a typical automatic, sequential, batch Ransomatic, it incorporates ingenious features to minimize marring of chromate conversion coating.

The push of a button starts a cycle of: transfer of a collected batch of work from a tank of cold water into the drum where work will receive a sequence of cold line rinse—recirculated chromate bright dip—cold line rinse—recirculated alkaline bleach—hot water rinse—recirculated hot air dry off and unload into receptacle. Complete automatic cycle takes less than 15 minutes for one 8 cu. ft. batch of work.

This Ransomatic occupies only 90 square feet and will greatly improve the finish of the customer's product, simultaneously effecting substantial savings in labor and floor space.

Similar Drum or Cabinet Type Ransomatics can be built in any size and for any combination of solutions for metal surface treatment.



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For 38 years, Ransohoff inventiveness, experience and willingness to tackle new unsolved problems has helped the "who's who" of the metal working industry keep their metal surface treatments in step with other production advancements. The Ransohoff Engineering and Production team is at your service.

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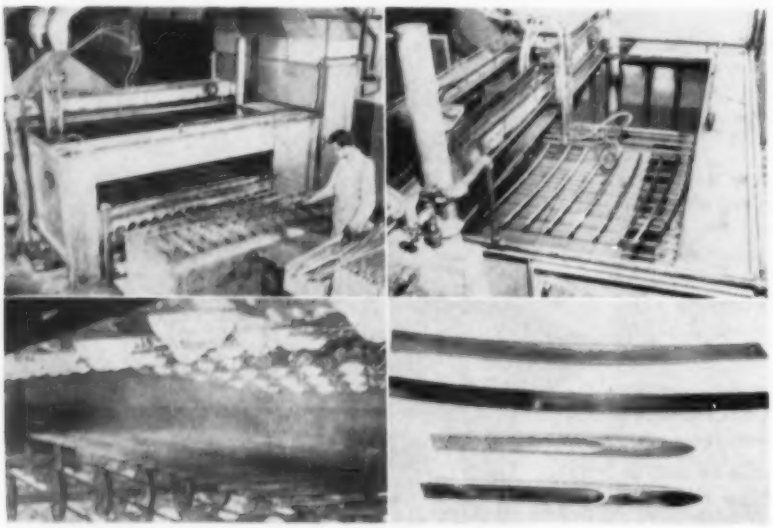

E—1019. Chromium Protector. Highly polished chromium and stainless steel auto parts are protected in shipment by a new strippable spray coating based on Bakelite vinyl resins that increases production rates and saves man-hours and storage space. Developed by a leading auto producer to handle decorative interior and exterior metal moldings formerly shipped in paper tubing, a new mechanized system enables two men to spray coat up to 1500 pieces per hour for service parts handling. About 40 of these parts, measuring anywhere from six to 96 inches long and from ¾ to 12 inches wide, could be packed per man-hour in paper tubing. The economical new system is based on the ability to spray with a durable coating about one hundredth of an inch thick, while the parts move on the cables that form the feed conveyor (top left photo). Carefully angled spray nozzles cover each part with a protective film based on Bakelite vinyl resins (top right photo). Resistant to moisture and abrasion, Bakelite vinyl resins, compounded by Dennis Chemical Company, form sturdy plastisol films that offer a cushion against scarring and marring polished parts in transit and yet are easily stripped off at the destination. Shallow trays under the spray recover excess plastisol for reuse. Varying the angle at which parts are placed on the endless moving cables accommodates parts up to 80 inches in length on compact equipment that measures 8 feet wide and 35 feet long. Banks of infra-red lamps cure the sprayed on plastisol to an elastic film in an oven operated at 325 deg. F. (bottom left photo). The cost of the strippable coating for metal parts (bottom right photo) is estimated at approximately 2.6 cents per square foot with a film thickness of about one-hundredth of an inch. Plastisol coatings based on Bakelite vinyl resins can also be dip or flow-coated on metal parts and applied hot or cold.

E—1020. "Coastal Finish" Paint in Spray Cans—Coastal Finish paint is now available from Westinghouse Electric Corporation in three convenient spray cans—one for each of the three coats that make up the complete finish. The spray-paint cans provide a convenient and simple way to touch-up transformers; when either pole-mounted or on the ground, and to paint other hard-to-reach spots.

One can contains the prime coat, which is composed of a vehicle giving good adhesion and chemical resistance to salts, acids, and alkalis. The second can contains the intermediate coat—the key to the successful performance of the three-coat finish. It is composed of modified phenolic and alkyd resins chosen for their resistance to heat, oxygen, salts, acids, and alkalis. The pigment is composed of mica flakes that overlay in the film to form a "shingled-roof" effect to further ward off moisture and oxygen and greatly increase the heat stability of the finish.

The third can contains the standard ASA No. 24 gray finish coat, which is composed of resins and pigments chosen to withstand the elements and to provide good appearance.

The 12-ounce cans are hermetically sealed and can be stored for years, providing they are kept out of direct sunlight and in temperatures not exceeding 120 degrees F.

E—1021. Color Identification—A new method for identifying metal bars and other forms in warehouses and plants is being marketed by Zaco Laboratories, a division of Zip Abrasive Company of Cleveland, O. according to C. L. Safford, Pres. A revolutionary method of applying color identification, Zip-Spray Speed Lacquer combines a quick-drying coding of any color with easy handling. Steel warehouses and other plants will no longer have to keep paints, brushes, and other bulky equipment on hand.

Metal can be identified and coded according to temper, gauge, pickle, alloy, or any distinguishing characteristic by using different colors. Combinations can also be used by completely spraying on the first color, then masking off an area for the second.

Zip-Spray Speed Lacquer can be used by warehouse men to maintain steel or non-ferrous metals in a clear and coherent "file." Easy identification means that orders may be filled faster, more efficiently, and possible confusion and waste eliminated. Steel inventories can be kept up to date by merely spraying and recording code colors in a master file as the steel comes in. Zip-Spray Speed Lacquer's quick-drying features also means a minimum of time taken on incoming stocks.

Another advantage is that Zip-Spray Speed Lacquer can be applied over oily bars with minimum bleeding through. An obvious application also, will be bundles of sheet steel which can be sprayed similarly, by merely spraying the end of the bundles.

Two Spray Master Pattern Cards are included in each carton for masking purposes. Convenient slits are provided for easy masking of metal.

Color File

STRIP PAINT FROM PLASTIC

with NORTHWEST'S *NEW* liquid stripper #11

This new stripper will remove most organic finishes from plastic WITHOUT attacking the base material.

Stripper No. 11 is safe and efficient. It is non-toxic, creates no fire hazard, fumes or odor.

The paint film is converted into a form easily rinsed off with water spray. Processed parts are FULLY cleaned ready for refinishing.

If you want real production results with economy call the Northwest Cleaning Specialist. There's a tested Northwest product to fit every cleaning requirement.

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Equipment & Supplies

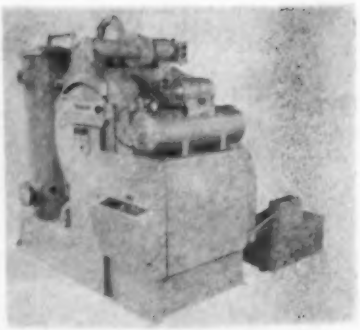
E—1022. Oil-Less Air Compressor—A new high capacity piston type air compressor is introduced by Bell & Gossett Co., Morton Grove, Ill. Radically new in design the new B&G Compressor delivers oil-free air. All units are constructed for continuous operation while delivering up to 175 psi pressure.

The portability and comparatively low cost of these new compressors, makes it adaptable to all types of industrial maintenance. Because of the oil-free air feature, they are particularly adaptable to all types of pneumatic tools and control systems.

The company's entry into the compressor field was prefaced by wide experience in the manufacture of centrifugal pumps and fractional horsepower motors. The company is one of the world's largest manufacturer of centrifugal pumps. It is also one of the larger manufacturers of fractional horsepower motors, all of which are used on its own products.

The secret behind the new oil-less feature is in the use of specially constructed graphite or carbon piston rings instead of conventional steel rings. Thus no oil is needed for lubricating the cylinder walls. Completely effective compression efficiency is the result with an extremely long life. No longer are expensive oil separators or filters needed in the air discharge line. The motor and compressor are direct-coupled and each cylinder is equipped with a safety overload valve.

Spray guns are the external mix type which means that a gun does not have to be dismantled for cleaning. They are fully professional type guns and are adjustable for coarse or fine spray in various patterns



No Oil

E—1023. Addition Agents for Zinc Plating—A series of addition agents for cyanide zinc plating, tailor-made to suit the particular needs of individual operators, has just been introduced by Federated Metals Division, American Smelting and Refining Company, New York, N. Y.

Marketed as the Zimax Series, these addition agents are the result of years of development. The members of the series are characterized by their ability to produce clear, bright deposits directly from the bath and increase the covering and throwing power of zinc baths. Containing no metallic components, they are more economical than previously available materials.

Zimax brighteners offer an ideal base for post-plate conversion coatings, as well as giving a bright finish direct from the bath.

One member of the Zimax series is BZ-20 Powder Barrel Zinc Brightener, a low cost material giving a clear, bright white deposit, with high staying power, and very uniform deposits in production. BZ-20 Powder gives a bright finish direct from the bath, but can also withstand a post-plate dip. A stock solution may be prepared by mixing BZ-20 Powder with cold water, then adding warm water.

Zimax BZ-33 Liquid Barrel Zinc Brightener is a low-cost concentrated brightener which produces blue-white deposits of maximum brilliance. High throwing power and covering power are incorporated in this material.

Included in the newly announced series is Zimax BZ Special Liquid Barrel Zinc Brightener, formulated for installations requiring any of the following: moderate price; deep, clear lustre of deposit; good staying power; elimination of the discoloration difficulties sometimes encountered with hot forced air drying; and elimination of an oily condition on bath surfaces sometimes resulting from other brighteners.

BZ Special Liquid may be used in "still" zinc plating in some installations in which there is agitation, either by a moving cathode bar, or in an automatic or semi-automatic unit.

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for copper and silver plating—

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IN CONVENIENT, DRY FORM

Du Pont's guaranteed high-purity potassium cyanide is ideal for *all* your copper and silver plating work.

Shipped in full open-head drums, Du Pont's crystalline potassium cyanide is easy to handle and convenient to store.

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Du Pont has new production facilities at Memphis, Tenn., to assure you a dependable domestic source for potassium cyanide.

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Du Pont's potassium cyanide is backed by a practical technical service to help you maintain plating efficiency.

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Equipment & Supplies

E—1024. Heavy-Duty Barrel—Lorco Model 200 is a rugged, heavy-duty barrel for precision finishing of stamped, forged, machined or cast parts. It is powered by a husky one-horsepower motor and is built to tumble heavy parts and to operate for long runs. Compartments are lined with a ¼-in thickness of Neoprene. Drum ends and wrapper sheet are of ¼-in steel plate, while the divider between compartments is of ⅜-in plate. Long life under severest operating conditions is assured by placing the two compartments together and using outboard bearings.

Inside dimensions of the octagonal compartments are 19 in across from flat to flat by 9½-in long; each compartment has a volume of 1.6 cubic feet and will hold a total load of approximately 250 lb. Inside dimensions of door openings are 8 by 7 in.

Flexibility in meeting the requirements of any finishing job is assured by a variable-speed drive that may be set over a range from 8 to 40 rpm. Motor is controlled by an Allen-Bradley drum-type forward and reversing switch to allow barrel to be run either forward or reverse. Motor and drive are wholly enclosed, but full-length door permits easy access for maintenance. A sturdy screen guard gives operator complete protection when barrel is being rotated. Two perforated drain doors allow drainage of water after tumbling. Angle irons are included in lower part of frame to support a horizontal screen for separating parts from chips when barrel is being unloaded.

Model 200 stands only 48 in high and occupies a floor space of 31 in deep by 38½ in wide. Entire unit is mounted on a ¼-in base plate for easy installation. Shipping weight is approximately 1,000 lb.

Bulldog Barrel

E—1025. Half the Labor of Application—A new vinyl protective coating that makes possible a sharp reduction of labor costs has been developed by Amercoat Corp. The new coating, AMERCOAT No. 87, can be applied at a thickness of 10 mils in a single cross-spray coat, thus providing a dense, heavy film that was previously obtainable only by multi-coat applications. According to the company, No. 87 Vinyl Mastic produces its unusual film thickness without sacrificing the chemical and moisture resistance for which vinyls are so well known.

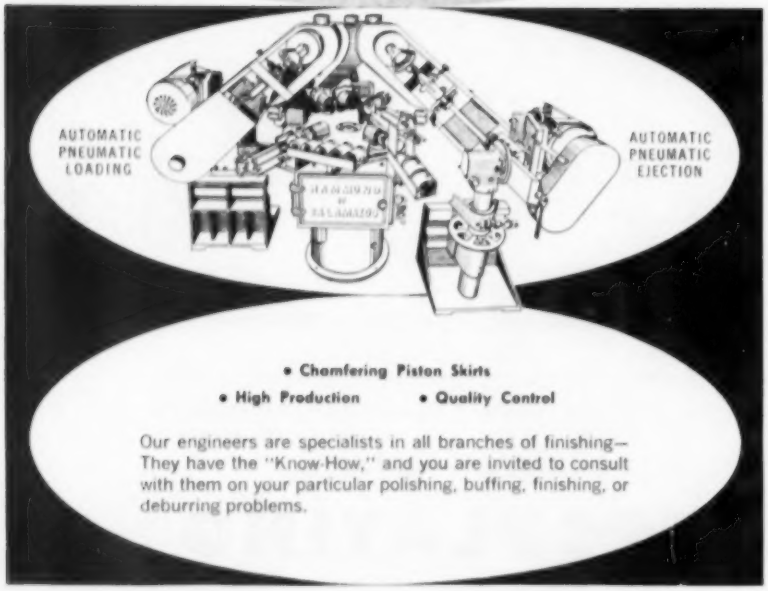
Although Amercoat No. 87 has much higher solids content than standard vinyl resin paints, the coating is easily applied with conventional industrial spray equipment. An additional feature is that the coating does not flow away from edges and sharp corners as do ordinary paints, and therefore provides extra protection for such areas which are normally more vulnerable to corrosive attack.

E—1026. DuBois Offers Stripping Compounds—To meet the need for stripping the new and highly resistant paints, enamels and other type finishes, The DuBois Co., Inc. announces RIP and RAZE, two entirely new liquid organic solvent type compounds.

Not only do these compounds meet new stripping needs but they keep pace with today's accelerated production schedules in that they provide unequalled speed of stripping as well.

These two compounds are intended for unheated usage. RIP is a mobile liquid for immersion tank use, on work of such size and type that it can be immersed. RAZE is a bodied liquid which clings to surfaces instead of running off. It is brushed on for stripping large assemblies, vehicles or other structures or units not suited to immersion.

Hammond of KALAMAZOO AUTOMATION



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Phospray can be cut with thinner as high as 3 to 1 without reducing effectiveness.

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Phospray cuts processing time, reduces finishing costs, and provides an easy sure-fire bond for organic finishes on almost any metal.

Phospray is made and guaranteed by Du-Lite, the metal finishing specialists.

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Du-Lite
METAL FINISHING SPECIALISTS

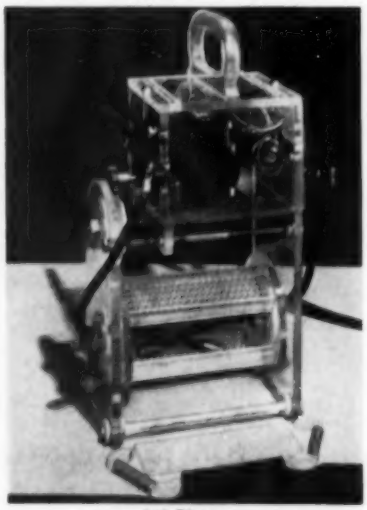
Equipment & Supplies

In either case, the immersion or brush off is followed by a suitable dip, spray or pressure rinse with water or in special cases with a suitable detergent for washoff.

RIP and RAZE are fire safe, displaying no true flash point.

E—1027. Barrel Units for Small Lots—Two new barrel units designed for electroplating small parts or small quantities of larger parts are announced by Technic, Inc.

Technic's new Model OH-42 is a dual barrel electroplating unit, and Model HP-4 is a portable plating barrel. Both are made of high temperature lucite, so that they can be used in any solution for electroplating precious metals, and will adapt readily to every other type of electroplating.

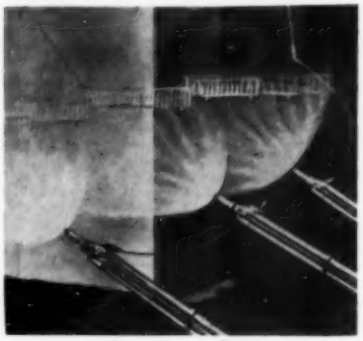


Lil Plater

Dual Barrel Model OH-42 is a complete barrelplating unit in itself, of one gallon capacity, with 60 cycle single phase 110 volt motor attached. Dimensions of the lucite tank are 7 inches x 7 inches x 6 inches D. The oblique barrel is an octagon measuring 2½ inches x 2½ inches, and the horizontal barrel is a hexagon measuring 4¼ inches x 2½ inches. Holes of standard size are 3/32 inch, and any size may be had on order. Rod for tank plating is included.

The Model HP-4 Portable Barrel is intended for use by immersion in any existing tank. Overall dimensions are 6 inches x 4¼ inches x 7¾ inches to the plating rods, the hexagonal barrel measuring 4¼ inches x 2½ inches. Standard holes are 1/16 inch. 110 volt 60 cycle single phase motor is attached.

E—1028. Power Supply for Electrostatic Spraying—Scientific Electric of Garfield, New Jersey, manufacturers of High Frequency and High Voltage Equipment announce the development of a new Ionic High Potential Power Supply for electrostatic paint spraying.



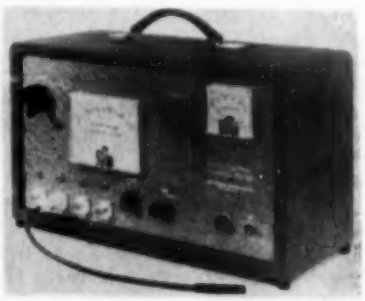
Super Ionic Guns

This new Ionic High Potential Power Supply, which is Underwriters' Laboratories approved is designated as Model HV-140. It is supplied as a two-piece, remote-controlled unit. The power supply unit itself is furnished in a heavy-gauge steel tank which is usually mounted above the spray booth out of reach of the operator. The control unit, which is designed for wall mounting, is supplied in a separate, heavy-gauge, polished aluminum cabinet and incorporates a special electronic spark-guard for safeguard against arc-overs.

The new electronic power supply unit is capable of producing a peak of 140 Kilovolts and is designed for use in conjunction with special "Super Ionic Guns" for electrostatic paint spraying.

E—1029. Non-destructive thickness tester for the metal finishing industry has been announced by Unit Process Assemblies, Inc., New York City. The unit permits inspection of 100 per cent of production, and will test thicknesses of metals deposited on metals, metals on non-conductors, and non-conductors on metals.

This is the first non-destructive tester which will accurately give direct readings of thicknesses of virtually any coating on any base, including silver on brass, copper on die-castings, nickel on brass, metallizing on plastics, or metallic coatings on ceramics, etc.



Thickness Tester

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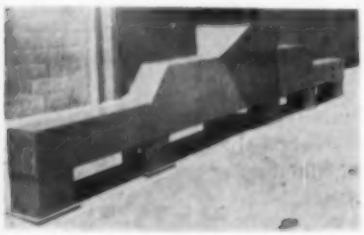
Equipment & Supplies

The electronic unit is compact and portable, permitting use in almost any location. Thicknesses are read directly from the instrument, and are determined in a matter of seconds.

E—1030. All Plastic Duct—A twenty foot unplasticized polyvinyl chloride duct was designed and fabricated by Comco, Inc., Div. of Enthone, Inc., for handling mixed acid fumes for a New Jersey manufacturer. The system was designed to remove the highly corrosive fumes at the rate of 13,000 cubic feet per minute. The



Big Duct

use of corrosion resistant polyvinyl chloride eliminates the need for expensive maintenance painting and frequent replacement.

E—1031. Addition Agent Increases Throwing Power. Wagner Brothers have developed a new liquid addition agent called "Krome-On" which, according to performance data reported by platers using the additive, can materially increase the throwing power of chromium plating baths.

In addition to the advantages of increased plating efficiencies, "Krome-On" furnishes a superior mist-inhibiting blanket to reduce spray and flue loss, thereby saving chromic acid waste. Reduced drag-out also minimizes waste disposal problems.

"Krome-On" is now available from Wagner Brothers' representatives in Chicago, Cincinnati, Indianapolis, Rochester, New York and Detroit.

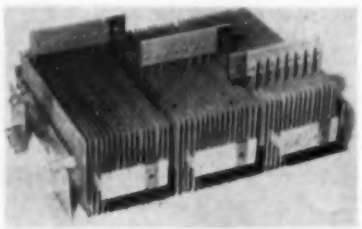
E—1032. pH Glass Electrodes—A new type of pH-sensitive glass which will benefit both laboratory and process control users of pH equipment is now being incorporated into certain pH electrodes manufactured by Beckman Instruments, Inc.

Known as E-2 glass, the new formula, which represents considerable research and development work, is especially suited for high pH measurements. Type E-2 glass replaces Type E glass in the original and widely-used Beckman blue-tipped, alkali-resistant electrodes.

Electrodes with the new formula glass are extremely valuable in the range above pH 10 where other electrodes fail to perform satisfactorily. Unlike older electrodes, they are also good over the entire 0-14 pH range at temperatures from 15 to 100 degrees C and offer improved resistance to acids, surface deterioration, aging and alkalis.

E-2 glass electrodes are available for use with Beckman Models G, M, N, H and H-2 pH meters and Beckman industrial pH flow and immersion assemblies.

E—1033. High Current, Low Voltage—Designed for such applications as battery charging and electroplating, two new series of high current low voltage power rectifiers have been introduced by Bradley Laboratories, Inc., New Haven, Conn. In this broadening of its selenium rectifier



High I. Low E.

line, the firm has started production of the largest vacuum processed plates it has yet made.

The new cells, designated as "XX" and "Z," are available in 26 volt a c ratings. The "XX" cells measure 6 by 10 inches and are rated at 10 amperes d c in single phase half-wave and double half-wave circuits or at 20 amperes d c, single phase bridge, or single phase center tap circuits. The type "Z" cell measures 6 by 15 inches and delivers d c at 15 and 30 amperes in the same respective circuits.

Improved temperature characteristics are possible with rectifiers composed of these plates. By mounting through holes punched at the ends of the plates, the central area of each cell where greatest heat generation takes place is left open for more efficient cooling. This mounting arrangement also allows for a minimum of material in terminal connections which considerably reduces external resistance.

E—1034. Less toxic than CCl_4—A new, highly efficient cleansing solvent that can be used with complete safety for most industrial applications is announced by Chem Industrial Co., Brooklyn, O.

Known as C-I-Sol, it is reputed to have cleaning properties closely resembling those of carbon tetrachloride even though it is up to 20 times less toxic. Because of this, heavier and more effective concentrations can be utilized without exposing workmen to possibly dangerous effects.

In addition to its low toxicity, C-I-Sol is non-flammable. As a result, fire hazards when working near an open flame or next to grinding operations are eliminated.

Death on Dirt

C-I-Sol is recommended for removing grease, wax, oil and tars from metal products, hand tools, machine tools and components, sheet metal, tubing, etc. Although not suitable for vapor degreasing, it is adaptable to cold cleaning, dip cleaning and bucket cleaning.

E—1035. Trouble Shooting Charts—Joseph B. Kushner, Stroudsburg, Pa., has announced the TANK DOCTOR, a copyrighted, new type of trouble shooting chart for electroplaters and plating department control chemists. The TANK DOCTOR gives in systematic order, the symptoms, the diagnoses and cures of and for practically any difficulty that can come up in the operation of the specific tank for which it is designed. The chart size is 8 inches x 10 inches.

The charts are printed on rigid, opaque white vinylite sheet stock, which makes them impervious to water, fumes, and the acids, chemicals and alkalies commonly found in the plating room. In addition, the print is protected by an overlay of transparent vinylite inseparably bonded to the opaque base, so that the print cannot be rubbed off.

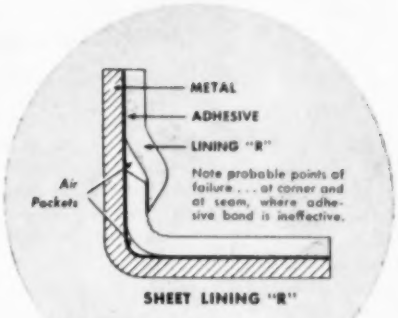
Available immediately are the CHROMIUM TANK DOCTOR which covers both decorative and hard chromium baths, the NICKEL TANK DOCTOR which covers bright nickel and Watts baths, and the COPPER TANK DOCTOR which covers rochelle and high efficiency cyanide baths.

E—1036. Throwaway Package—The bulky, hard-to-handle carboys normally used for storing and shipping bright nickel plating solutions have been made obsolete at The Seymour Manufacturing Company. Replacing the old five-gallon glass behemoths is a new, fiberboard carton containing four individual one-gallon bottles. Unlike the old containers, the new units are nonreturnable.

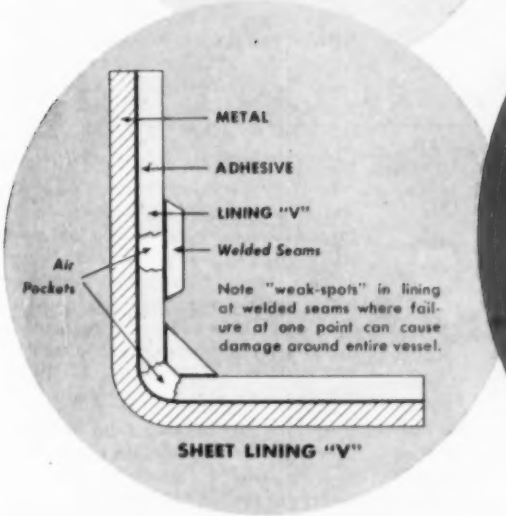
For positive protection* against chemical attack, specify

A and P FINISHING TP-111

the improved sprayable plastisol that forms a continuous, seamless protective lining fused directly to the primed metal surfaces of your plating and processing equipment


METAL
ADHESIVE
LINING "R"
Air Pockets
Note probable points of failure . . . at corner and at seam, where adhesive bond is ineffective.

SHEET LINING "R"


METAL
ADHESIVE
LINING "V"
Welded Seams
Air Pockets
Note "weak-spots" in lining at welded seams where failure at one point can cause damage around entire vessel.

SHEET LINING "V"

METAL
TP-111 LINING
Note continuous TP-111 membrane fused directly to sandblasted, primed metal surfaces. No seams, no joints, no air pockets. Instead, a stronger, uniform mechanical bond throughout the vessel.

TP-111 PLASTISOL LINING

Compare the advantages of TP-111 over conventional sheet linings!

● **CONTINUOUS MEMBRANE**—As applied by A & P Finishing specialists, TP-111 forms a continuous membrane lining completely free of the joints, seams, and air pockets normally found in conventional sheet linings. Such breaks in a lining are generally considered weak spots where failure would permit liquid to flow to various parts of the vessel, causing extensive damage and loss of current density.

● **STRONGER BOND**—A & P Finishing TP-111 is fused directly to primed, sandblasted metal surfaces . . . thus effecting a stronger mechanical bond than that produced by adhesives used with conventional linings. This also permits use of TP-111 on higher temperature applications where adhesives are apt to soften causing a separation of the sheet lining from the base metal. Further, in the event of accidental damage to the TP-111 lining, chemical attack and undercutting is localized.

● **CONTROLLED HARDNESS**—The film hardness of TP-111 can be controlled to meet individual job requirements by A & P Finishing specialists. In addition, greater chemical and abrasion resistance can be effected through formulation and curing techniques which produce an unusually dense and durable membrane.

* ***POSITIVE PROTECTION*** — Protective linings are only as effective as the method by which they are applied. That's why it pays to insist upon proven A & P Finishing TP-111 linings as installed in our plant by workmen recognized as pioneers in this field. All work guaranteed and surprisingly low in cost. Available, too, through equipment manufacturers and plating jobbers. Write for details today!

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Equipment & Supplies

E—1037. Add Booths, Ovens and Flow Coaters—Paint spray booths, baking ovens and flow coating machines have been added to the line of cleaning and phosphatizing machines and conveyors designed and manufactured by the Industrial Washing Machine Corp., Matawan, N. J., it was announced by Howard M. Sadwith, President of the company. The addition of this equipment will now enable Industrial to supply its customers with every means of product finishing, from the initial preparation to the completed paint job.

The booths, ovens and flow coating machines are made in all sizes for any capacity of work, from small component parts to completed automobiles or other large items. They can be constructed according to the design and specifications of the customer, or will be completely engineered by Industrial's technicians. Heating may be by steam, gas, electricity or oil.

E—1038. To Strip Aluminum Safely—Oakite Stripper No. 110, designed to remove zinc chromate primers from aluminum without affecting the metal surface, has recently been introduced by Oakite Products, Inc., manufacturers of industrial cleaning and metal treating materials.

A two-phase solvent material, Oakite Stripper No. 110 is used full strength. The part to be stripped is immersed completely in the solvent, under the surface oil seal, which should be maintained continuously. According to the manufacturers, the material will remove zinc chromate primers and other finishes from aluminum with complete safety when used as recommended. Oakite Stripper No. 110 has a flash point of 290° F, and does its job faster when heated to 140° to 180° F. A pressure water rinse, warm or cold, is recommended to float off the loosened paint.

E—1039. Rare Inorganic Chemicals—D & F Chemical Co. has recently added several new inorganic compounds to their regular catalogue of rare chemicals.

In most cases they are the sole producers of these compounds. They are being produced on a larger than laboratory scale.

The following list is representative of the compounds. (1) Hexamminecobalt (III) Bromide (2) Hydroxylammonium Arsenate (3) Potassium Trioxalatoaluminiate (4) Tris(Ethylenediamine) Chromium (III) Bromide (5) Barium Bromate (6) Calcium Dithionate (7) Cobalt Cyanide (8) Zirconium Disilicide (9) Silver Chlorate (10) Arsenic Hydride.

E—1040. Plenty of Air, Wherever the Work—That statement describes the newest air compressor being made by the DeVilbiss Company, spray painting equipment manufacturer, Toledo, Ohio.

The compressor, carrying the designation PJE-521 when powered by a gasoline engine and PJ-521 when electric motor driven, is a compact, portable unit that has been designed for use by smaller contract painters, homeowners, farmers and small shops.

The unit, rated at ½ horsepower, will deliver air at the right pressure for spray painting and other low pressure uses. Thoroughly tested in the laboratory and in the field, the PJ line has proved its durability and dependability.

DeVilbiss engineers have designed the air reservoir and condensation chamber to serve also as carrying handles for the relatively light-weight unit.

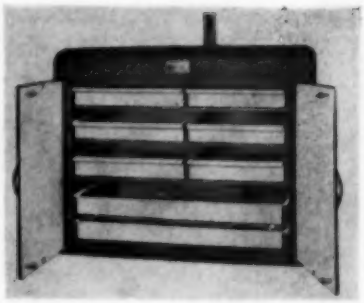
The compressor, easily maneuvered indoors or out, has two rubber tired wheels for moving from place to place. The carrying handles simplify lifting the unit into the trunk of a car or onto a truck bed. In operation the complete unit rests on the rubber tired wheels and two rubber padded feet which provide a firm foundation.

E—1041. High Speed Paint Stripper. Northwest Chemical Company, Detroit, Mich. announces the development of Liquid Stripper No. 11—a completely new approach to chemically stripping paint and other organic finishes from plastics.

Liquid Stripper No. 11 has proved its ability to completely remove organic finishes phenomenally fast in one run-through, yet not react with most plastics.

Liquid Stripper No. 11 is safe, involves no fire hazard, no odor, no fumes, and is non-toxic. It converts the paint film into a soluble form that is easily rinsed off, and the stripper contains only chemicals that can be flushed through usual waste disposal lines.

The new stripper has been thoroughly tested in production and is immediately available for general distribution. The company offers to process sample parts to prove the effectiveness of this new product.



E—1042. Small Oven for Drying Operations—A new addition to their standard line of low-cost ovens, called Model PL-2A, for drying operations such as plastic granules, parts after cleaning and loose materials that require dehydration, has been added by Grieve-Hendry Co. of Chicago, Ill.

This oven has many outstanding features including uniform temperature throughout made possible by drawing in fresh air and driving out stale air through specially located vents by motor driven fan. The motor is located on the outside of the unit. It is claimed that no stratification is possible. Adjustable damper gives wide range of constant temperature.

Construction is heavy gauge steel; four shelves of expanded metal; exterior contour is formed for strength; asbestos air-cell insulation; and baked enamel gray wrinkle finish with plated hardware; make up the oven. It accommodates eight 2 in x 12 in x 23 in drying pans—as illustrated. Temperature is adjustable to 325° F. It operates from 110 volt outlet.

E—1043. Thick-Coat Trial Kit—The Pennsylvania Salt Manufacturing Company's Corrosion Engineering Dept. announces availability of a low cost trial kit of Thick-Coat, its new resin coating product for humid and corrosive atmospheres. This kit, designed for testing purposes, contains two quarts of Thick-Coat, one quart of Pennsalt Lock Prime, a quart of Pennpaint thinner, complete specifications and directions for use.

The Thick-Coat system provides a durable protective coating for new or corroded metal, concrete and wood surfaces exposed to fumes, corrosive atmospheres and spillage of destructive chemicals.

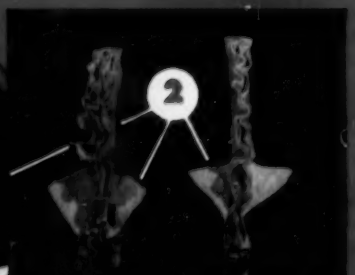
Thick-Coat has excellent flow qualities and is applied like regular maintenance paint by brush, roller or spray as it comes from the can. In a three-coat system—one primer and two top coats—it will build up to a minimum of 6 mils dry film thickness. Containing over 60 per cent solids by weight, it assures long-lasting protection on edges, prominences and crevices, as well as on plane surfaces. Thick-Coat is regularly offered in white, green, slate gray, silver gray, and black and may be obtained in other colors on special order.

No other Buff...

has all these advantages

CODMAN NON-FRAY BUFFS

1. THICKNESS OF RING VARIES DENSITY
2. TRAILING ENDS — (Safety)
3. NON-COMPRESSIBLE CONSTRUCTION
4. NON-METALLIC CENTER — (No Shaft Scoring)



OPEN FACE CLOSED FACE

Available-Closed or Open Face Ventilated, Of Course, When Necessary

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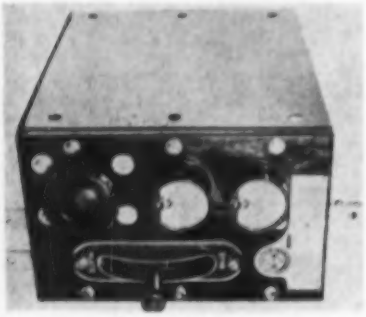
Equipment & Supplies

E—1044. Carbon Pile Rheostat—Hanson-Van Winkle-Munning Co. have announced a carbon pile tank rheostat for electroplating that is particularly useful when precise current control is required. The new Universal Tank Rheostat consists of a rectangular cast-in-plate rheostat, an adjustable nickel-chromium resistor, a reversing switch, a voltmeter and an ammeter.



Current Controller

Beside providing control of the plating current, the new H-VW-M Universal Rheostat permits the selection of the proper tank rheostat without specifying "voltage drop." Ordinarily, this is not possible with standard knife- or rotary-type rheostats. The new unit provides all tank voltages for a specified line voltage up to 12 volts, and amperage ranging from 30 to 250.

This flexibility and range is possible because of the adjustable resistor located at the top of the heavy steel case which houses the components of the unit. This feature permits basic adjustments to be made on the unit after installation. Fine current adjustments are made by the carbon pile component.

Since carbon pile rheostats provide stepless control of electrical current, they are particularly applicable where fine current adjustments are desired. Since the basic adjustments are made with the resistor, the carbon pile operates in the range of its maximum effectiveness.

The reversing switch on the Universal rheostat reverses the current going into the plating tank. This etching technique is often used to advantage in chromium plating to obtain good adherence of plated metal. The Universal unit is equipped with ammeter and voltmeter, although individual units may be specified without either or both.

H-VW-M's Universal carbon pile tank rheostat is available in four sizes. The smallest unit is rated at 30 or 60 amps, with plating line voltages up to 12 volts. The largest is rated at 125 or 250 amps over the same voltage range. All units are mounted in heavy steel cases that are open at top and bottom for ventilation.

E—1045. Flooring Material Resists Attack. The Ceilcote Company Inc. announces the development, manufacture and availability of Coro-Crete, a new corrosion proof floor material which provides increased protection from attack by alkalis, solvents and acids. Developed for application directly over concrete the new material is composed of three basic ingredients: (1) a thermosetting resin liquid, (2) a hardening agent and (3) an aggregate-type filler.

Developed to meet wide applicational requirements in chemical processing, food processing, plating and metal working industries the new material is mixed at the job site for immediate application. In most instances where conventional coating membranes will be destroyed by solvents, exposing the concrete base to attack by acids, Coro-Crete can be used successfully. The protection provided is greatly superior to that offered with most brick flooring and membrane.

Coro-Crete handles like cement topping and is applied in thicknesses from ¼-inch minimum to ⅜-inch maximum (per layer). Unlike cement, however, Coro-Crete cures in only a few hours time to a dense, impermeable and non-dusting surface. Because of its quick curing qualities, Coro-Crete is especially useful when minimum plant "downtime" is important.

Tough Floor

This new corrosion-proof material is recommended for existing as well as new concrete floor surfaces. Coro-Crete's adhesion to concrete is excellent and installation data indicates that the bond of Coro-Crete and concrete is stronger than the concrete itself. In addition, Tabor abrasion tests show Coro-Crete to be two to four times more resistant to abrasion than most concrete floors. Its physical strength is approximately four times greater than concrete.

E—1046. Research Model Demineralizer—A new research model demineralizer or ion-exchange kit is announced this month by the Barnstead Still & Sterilizer Company. The new Model RE-1 Research Demineralizer has been developed to provide a laboratory with all of the basic material and reference data needed to explore the properties of twelve of the newest cation and anion resins in both highly basic and weakly basic types.

The complete unit consists of two transparent Lucite ion-exchange columns, twelve jars of resins of assorted types, five cation and seven anion, and a manual of more than 100 pages of technical data on the resins. Instructions for operating as a mixed-bed or a two-bed ion-exchanger are included and additional units can be connected in series for multiple-bed experiments.

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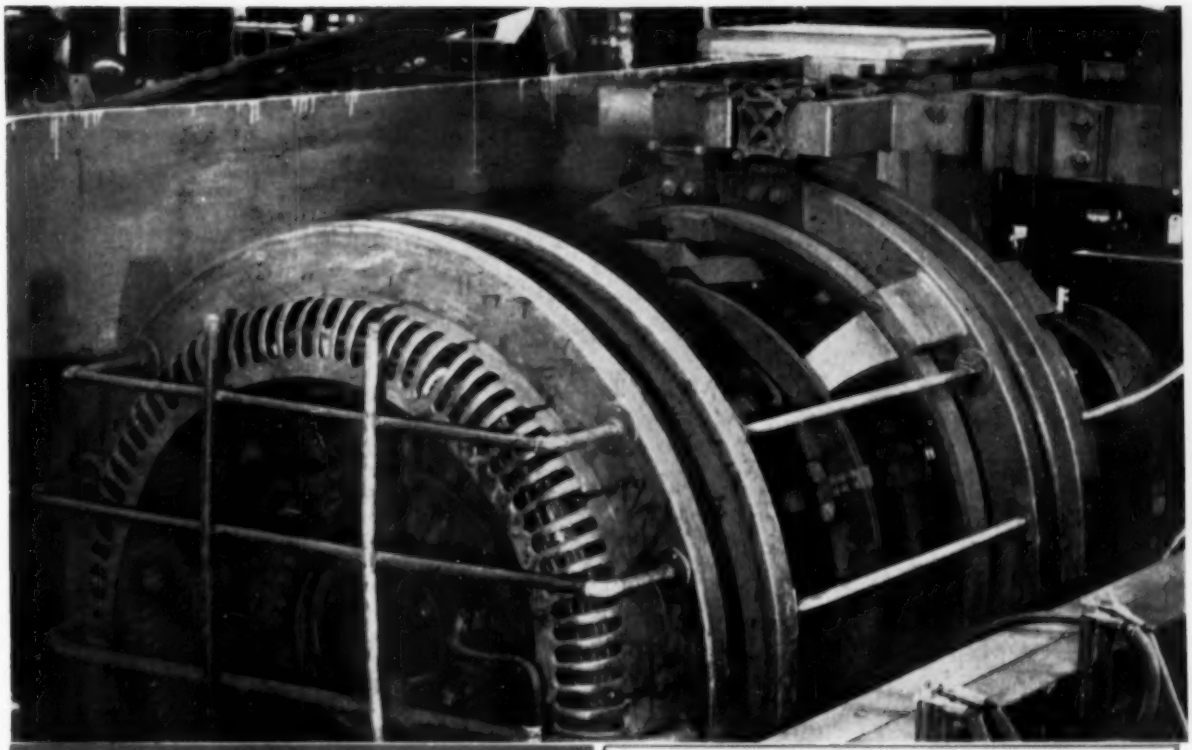

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For product information write for bulletins D-101 and D-102—for names of users and installation data ask for bulletin D-104.

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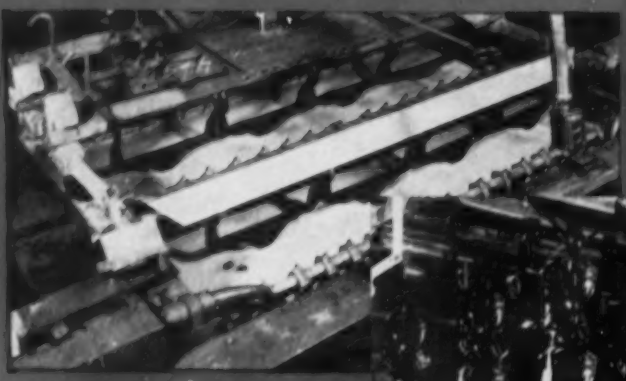

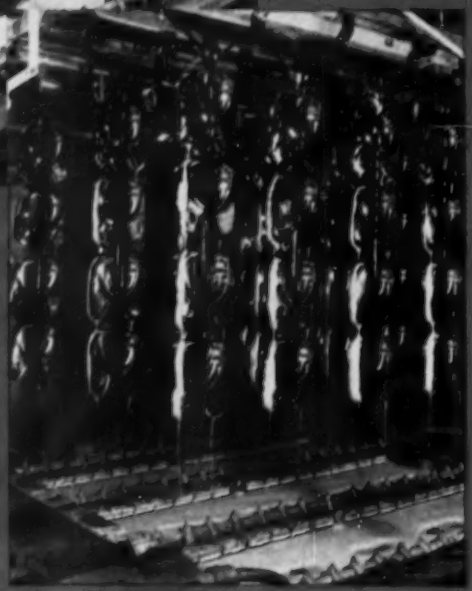

Zero-Mist creates a thin blanket of foam on the surface of the plating solutions. Under specified operating conditions losses from spray are zero.

Dragout is reduced with Zero-Mist. This saves valuable chromic acid, and greatly reduces waste disposal costs. Also note clean anode rods and hooks due to mist and spray control.

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Many chrome platers are now using Zero-Mist with amazing results. Here's what it will do for you: give absolute control of chromic acid mist and spray saving up to 30% of chromic acid loss through the ventilating ducts—reduce the workroom air pollution—cut dragout losses—lessen pollution of rinse water—save on maintenance of existing hoods, ducts and fans used in ventilating systems—cut your chromic acid losses from mist, spray and dragout up to 70%.

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Equipment & Supplies

E—1047. Bright Copper Magic—This is a non-alloy, non-critical copper plating system that plates as well and as bright as the best bright nickel. In some instances therefore, it eliminates the need for bright nickel; in other instances it greatly cuts down the use of bright nickel, eliminating also the difficult problem of obtaining same, and the high cost. This very ductile, tolerant, easy-to-operate copper plating systems plates directly over your metal in a matter of seconds without a strike; within 3 to 5 minutes Bright Copper Magic covers an article with a brilliant copper finish that is very dense and easy to buff, and which can then be flashed with Brass, Nickel, Chrome, etc. One of the attractive features of the product is that it is worked at temperatures of about 90° to 100° F, requires extremely low amperage and voltage, thereby saving power and equipment costs. Bright Copper Magic is inexpensive; additives required for replenishment are moderate. Standard rochelle-copper analysis is used for maintenance. Excellent results have been found with Hull Cell and porosity tests.

E—1048. Alkyd Flat Paints—Aliphatic alkyd flat paints can be flatted effectively by the use of a high melting point synthetic wax. This flatting agent, "Acrawax" C Powdered, is a fairly hard moisture resistant wax which gives additional advantages by acting as a slip agent and by improving wear and moisture resistance. The incorporation of this synthetic wax increases the viscosity and improves the brushability of the paint.

"Acrawax" C Powdered is added to the paint by treating it as a pigment in the pigment grinding process. A gel containing about 20 per cent "Acrawax" C Powdered is made by heating it to 110° F in mineral spirits. The gel, which forms on cooling, is added to the pigment grind. The amount of "Acrawax" C Powdered which is used is 1 per cent to 2 per cent, dry basis, on the weight of the total paint formula.

E—1049. Barrelled Air Conditioning Breaks Fatigue Barrier—Barrelled Air Conditioning, a new development in liquid insulation, promises to substantially increase summer production in plants where it is used, announces the manufacturer, Colonial Refining & Chemical Company of Cleveland, Ohio. According to independent surveys, factory production in the summer of 1954 dropped from 15 per cent to 8 per cent in various sections of the United States with resultant loss to industry of millions of dollars. 3R Aluminum, the original "Barrelled Air Conditioning," breaks the fatigue barrier by reducing building temperature up to 15 degrees.

Thus, a factory with scorching summer heat of 98 degrees in July can well expect to lower temperature into the comfortable 80's after applying a one coat application of 3R Aluminum to their black, heat absorbing roofs.

Where air conditioning equipment is in use, 3R Aluminum will reduce the load, and lessen operating cost. This product is applied by brush, is entirely a cold process, and in addition to insulation, provides excellent waterproofing protection on all types of roofs but shingle. Barrelled Air Conditioning is sold with the Reynolds Metals Company Warranty Seal of Approval.

E—1050. Oxygen Analyzer—Arnold O. Beckman, Inc., pioneers of paramagnetic Oxygen Analyzers that provide a direct physical measurement of oxygen content without resort to catalysts, chemicals, filaments, glassware, etc., announces an addition to their line of oxygen analyzers. The new instrument—designated the Model C2P Oxygen Analyzer—is particularly designed for applications requiring a quick, simple, accurate means of measuring oxygen with an instrument that is portable for convenient use in the field, plant, or laboratory.

E—1051. Double Oscillating Cylinder Improves Barrel Plating—More even exposure of work for uniform metal deposit in barrel plating is afforded by a new double oscillating cylinder announced by the Belke Manufacturing Company, Chicago, Ill.

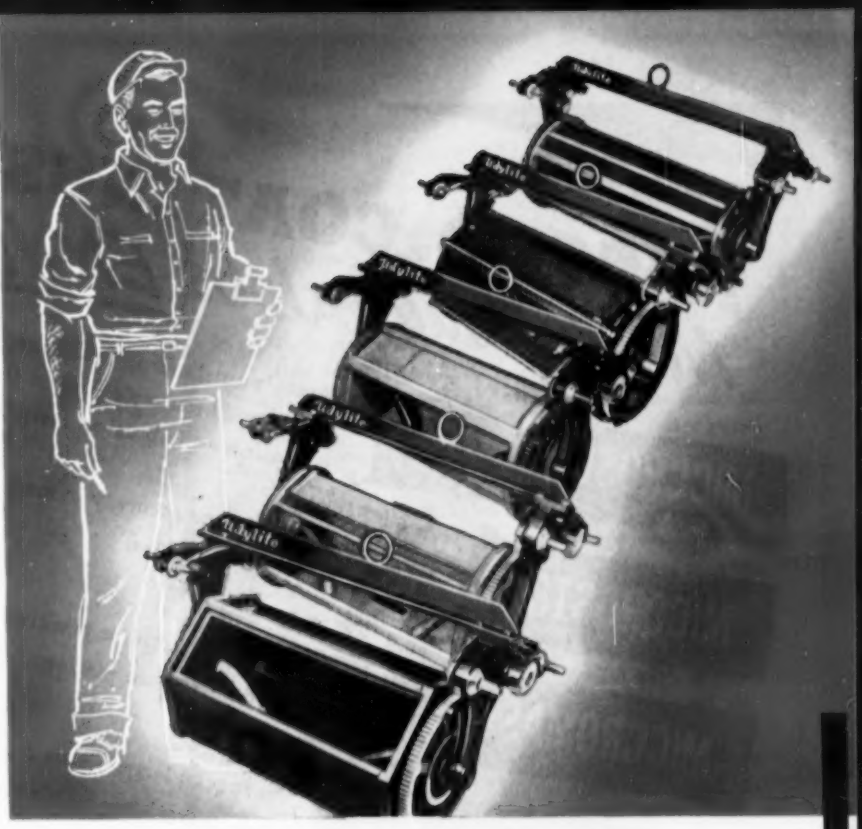
Eccentric mounting raises and lowers opposite ends of the cylinder as it rotates. The double oscillating motion moves the work in and out—away from the cylinder ends-back and forth across the cylinder. No parts remain shielded by the cylinder ends.

All parts are exposed to plating current with uniformity that produces a deposit of specified thickness in less time and with less metal.

The added motion, with no increase in cylinder speed, helps break apart washers and other objects that tend to stick together.

The double oscillating cylinders are furnished for barrels of all sizes from large 14 x 30s to small 6 x 12 Portables.

E—1052. Tilting Tumbling Machines—The Baird Machine Co. of Stratford, Conn. introduces Model H Oblique Tilting Machine with new features and refinements of design that improve operation and add high degrees of safety and convenience for the operator. There are few moving parts; controls and adjustments are conveniently located and bottle barrels are easily emptied by manual-hydraulic or power tilting. Little floor space is needed and machine is offset on base for solidity. Motor acts as balance for load. Barrels of different shapes and materials may be mounted on the Model H machine to suit requirements.



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Along with fine engineering Udylite is in continuous search for materials giving longer life and greater over-all economies in barrel plating. Udylite manufactures barrels of Rubber, Bakelite, Melamine, Lucite and now in turn has developed Tempron Hard Rubber.

Tempron Hard Rubber is recommended as the best plating barrel cylinder material now available, but its characteristics require special construction. Udylite's new construction (patent pending) features interlocking panels and ribs with the added advantage that panels, ribs, rails and cylinder heads are individually replaceable.

Tempron Hard Rubber has greater abrasion resistance, will handle more cleaning and plating solutions at higher temperatures including hot Stannate Tin, and with Udylite's new construction, will take the hard pounding of heavier loads day after day.

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AIRLESS SPRAY PAINTING*

By

JAMES A. BEDE†

A very substantial reduction in the cost of applying paints can be achieved by an entirely new process called, Airless Spray Painting. This process has now been developed and perfected. It is predicated upon accomplishing atomization by straight hydraulic pressure without any air whatsoever. It requires heating the paint to high temperatures and spraying it under pressure through a suitable nozzle. The spray duplicates what is accomplished by conventional air atomization but it eliminates at one stroke much of the waste and other handicaps unavoidably associated with regular air spray. There is practically no rebound of paint particles. Not only is the paint loss due to overspray (which in many cases exceeds 50 per cent) greatly reduced, but the health hazard too often found with regular spraying is eliminated. Exploratory and development work on this process has been carried on for over three years and it has been established beyond a question of doubt that the process is predicated upon sound principles and can bring great benefits. However, because we were traveling uncharted paths, we encountered many mechanical problems such as wearing out of the equipment due to abrasive action of pigments. These difficulties have now been solved and the process is available to the entire paint industry. Since the cost of applying paint in most cases far exceeds the cost of the paint itself, this new method of spraying can have significant import to the industry.

OUTLINE OF CONVENTIONAL PAINTING METHODS

Until 50 years ago, everything that was painted was either brushed or dipped. Brush painting is one of the very few operations the human race is doing exactly as the cavemen did. The cavemen dipped a wad of fur into a pot of colored goo and dabbed this on the wall. The only thing we have done to improve on this procedure is to put a handle on the wad of fur. Otherwise, brush painting is still the same, crude, primitive method of applying paint.

About 50 years ago, a faster method of painting was developed whereby paint was broken up into fine particles by compressed air and blown on to the surface to be painted. Because spray painting proved to be a much cleaner and faster method of applying finishes, it gained general acceptance in industry in spite of very severe, serious handicaps. A recognized drawback in atomizing paint with air is the fact that paint particles are carried along with the blast of air. As the air stream strikes an object, it is deflected and carries with it the finely atomized particles. That is why, in spray painting we have such a large paint loss and why we have a big cloud of spray dust surrounding the working area. This has been not only the cause of great paint loss, but has been detrimental to the health of the sprayer. It was found the only remedy for this was to provide a spray booth, whereby a huge volume of air is sucked into and expelled from the spray booth carrying with it all overspray. To prevent paint particles from being blown out of the building and polluting the surrounding air, water wash booths have been adopted in congested areas, but this merely adds to the problem of spray booth maintenance.

*Presented at the 42nd Annual AES Convention, Cleveland, Ohio. The discussion following the presentation is not included here, but will be found in the "Annual Proceedings of the AES, 1955."

†President, Bede International Development Co., Cleveland, Ohio.

With airless spray painting, this huge air movement is unnecessary. The ventilation requirements are simply to take away the solvent fumes—a little more ventilation than would be required for a dipping operation. Since such a small air movement eliminates the chance of blowing paint particles out of the building, trapping these particles by a water curtain is unnecessary.

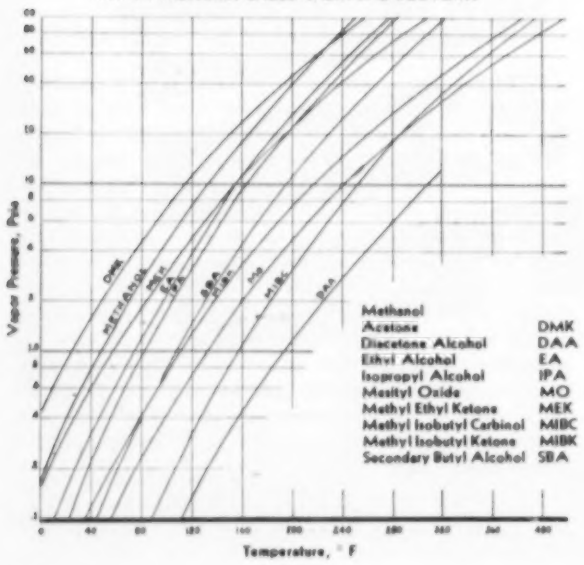
Because of the great quantity of spray dust generated, spray painting has been almost entirely restricted to operations that can be done in a spray booth. Maintenance painting has remained preponderantly a brushing operation. Now, with airless spray painting most maintenance painting can be done by spraying. This applies not only for factory work but also for homes, both inside and out. Where a heavy coat is desired, this process will enable putting on two or three times the film thickness in one coat than is possible by conventional methods.

PRINCIPLES BEHIND AIRLESS SPRAY PAINTING

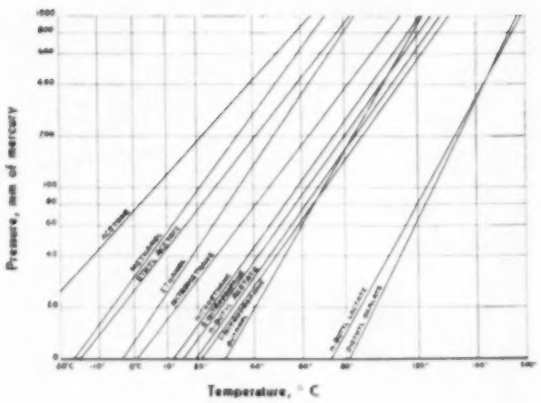
Airless atomization is predicated upon harnessing heat and pressure, the two basic forces of nature so commonly used in many industries. With regular spraying an external force—compressed air—converges on a stream of paint coming out of the fluid tip of the gun. With airless spray painting atomization is accomplished because internal forces of expansion are suddenly released. To accomplish atomization, two forces are utilized. One is the mechanical force of hydraulic pressure released through a proper restrictive nozzle (as water is broken up by a garden hose). The second force is vapor pressure. The paint is heated to such a high temperature (180° to 200° F, for synthetics; 160° for lacquers) that a fraction of the solvent content is brought close to the boiling point. Lacquers generally attain a vapor pressure of 5 to 7 lbs, synthetics 8 to 12 lbs above atmospheric pressure. However, because the circuit is under pressure (from 300 to 600 psi) the solvents do not actually boil. Upon release to atmosphere, these solvents will burst into gas thus affecting an additional breakup of the paint particles. In effect, therefore, what we are doing is *using the solvent within the paint as an atomizing agent.*

With regular spray painting from 500 to 700 cubic inches of air is required to properly atomize one cubic inch of paint.

VAPOR PRESSURES SHELL CHEMICAL SOLVENTS



VAPOR PRESSURE OF CSC SOLVENTS*



It is interesting to note that in converting a solvent into a gas, the rate of expansion is approximately 1500:1. Since it is quite obvious that the internal force of expansion is far more effective in achieving breakup of paint into particles, we can see that a relatively small amount of the liquid converted into a gas will be very beneficial. This combined with the straight hydraulic force achieves very fine atomization.

Two basic inventions were required to make this process possible. First was the working out of the process. Hydraulic spraying of paints has been tried for many years by many people. They failed because spraying a heavy bodied paint was impossible. To enable spraying with straight hydraulic pressure the material had to be thinned out so excessively (down to 5 per cent to 10 per cent solids), that the idea was impractical. The answer to the obstacle was to heat the paint, to lower its viscosity to a watery consistency by heat instead of solvents. Heat also builds up a vapor pressure which assists in atomization, as explained above.

The second invention was the development of a suitable paint heater, one that would be safe and could handle the relatively high pressures. When the Bede Paint Heater (Model U) was designed it had this requirement as its goal. Patents have been issued on the paint heater (U. S. Patent Nos. 2,481,813 and 2,576,558) and patent is applied for on the process as a whole.

WHAT TYPES OF FINISHES CAN BE SPRAYED

All types of finishes can be sprayed: lacquers, synthetics, wrinkles, varnishes, etc. Material can be very thin or very heavy bodied, as desired. The paint formulator in adjusting the finish for airless does not face any serious problems. The key factor to consider is the solvent composition, preferably a blend of high and low boilers. In a majority of cases the type of solvent composition required for airless is halfway between the range required for cold spray and hot spray.

The viscosity of the material determines the film thickness obtained. There is no difficulty in obtaining a very heavy film if it is desired. This is mainly due to the fact that with airless it is possible to dissipate more solvent, in the process of atomization, than is possible with the old conventional methods. This rate of dissipation is controlled by the selection of solvents of the desired boiling range and the temperature setting in the paint heater. Once the ideal optimum balance is determined, spray performance and film thicknesses can be held to exact standards.

*Commercial Solvents Corp.

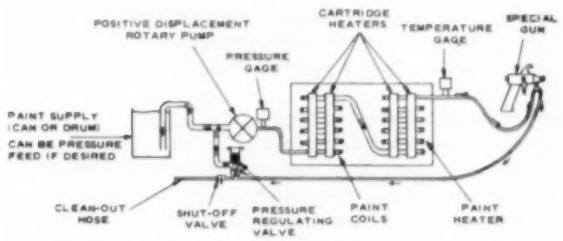
Because there is a strong aptitude to put on a heavy film of lacquer in one coat, there is a tendency to pinhole unless the proper solvent balance is attained. A little experimenting will provide the answer to satisfactory results. As paint chemists gain more experience in formulating for this process, it is expected that increasingly better results will be obtained.

DESCRIPTION OF EQUIPMENT

All of the equipment used in the Bede Airless Spray Painting System is especially designed for this operation. Here is how the system works:

Paint is syphoned by a pump into the system, sent through the heater to the spray gun and the unused portion recirculated (pressure feed can be used but is not necessary). Circulation is necessary to maintain hot paint at the gun nozzle at all times. Pressure in the circuit is maintained (generally between 300 to 600 psi) by a pressure relief valve on the return side of the circuit.

The spray gun is nothing more than a trigger. It is lighter than the conventional gun. Spray performance, the volume and angle of spray, is controlled not by a gun adjustment but by the selection of the nozzle. Thus, that all-important factor of balancing atomization by spray gun control is taken out of the hands of the individual operator and established as a fixed uniform procedure.



Flow diagram of Bede Airless Spray Painting System

Two types of pumps are available. One is a gear pump driven by an explosion proof electric motor with a variable speed control. The other is an air-operated piston pump, especially designed to eliminate pulsation and able to pump any abrasive materials with a minimum amount of maintenance.

The fluid hose is a special Teflon lined stainless steel braided hose designed to withstand high pressures and temperatures. It is designed for a working pressure of 1000 lb psi with a bursting test of over 10,000 lb and is not affected by temperatures ranging from $-60°$ F to $+450°$ F. Teflon is not affected by any known natural or synthetic solvents; therefore, it has distinct advantages for use in the airless application. The surprising thing about the hose is that it is lighter and more flexible than a conventional paint hose.

When airless systems were first installed on the production floor, difficulties were encountered mainly due to rapid wear on nozzles and pumps. We are now manufacturing tungsten carbide and sapphire nozzles that stand up very satisfactorily to the most abrasive finishes. Also the new piston pump satisfies our quest for a pump to withstand the abrasive action of pigments. That the piston pumps would perform far more satisfactorily than gear pumps has long been recognized, the big problem was to solve pulsation which is a serious problem on thin liquids at the high pressures required for airless spray painting. These developments have now closed the gap on limitations of the equipment and we are now in a position to serve all industry.

BENEFITS ACHIEVED BY AIRLESS SPRAY PAINTING

Airless spray painting opens up an entirely new level of operation in spray painting procedure. At one stroke, much of the waste in labor and materials is eliminated and in many cases enabling a far superior quality finish.

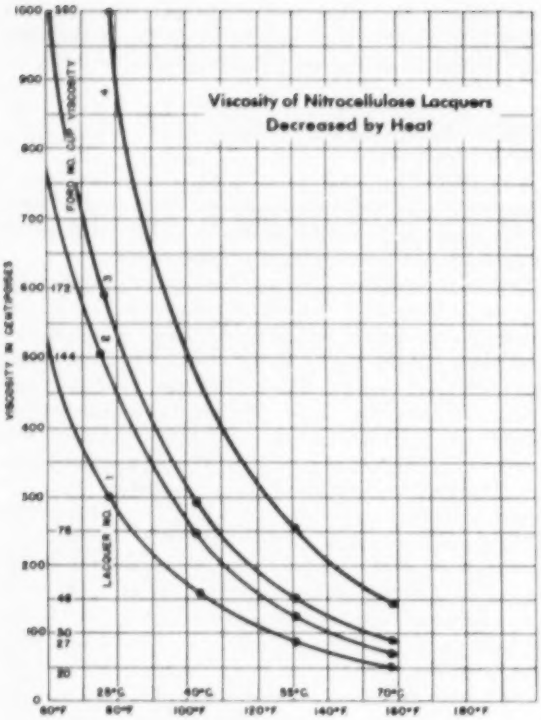
The biggest single advantage is reduction in paint loss due to overspray. A conservative figure for an average industrial installation utilizing standard spray painting methods is a paint loss of 50 per cent. When considering the yearly consumption of paint per gun, we realize how serious this paint loss can be. Further, this overspray complicates the problem of proper spray booth cleanliness and maintenance. With the correct use of airless spray equipment this paint loss is reduced very considerably.

Another important benefit is reduction in health hazards. With standard spraying processes, there are certain conditions of work, such as painting inside of a cabinet or tool box, where it is unavoidable to have rebound of the spray dust striking the spray operator regardless of how effcient the spray booth functions. In many industrial plants there are unavoidable conditions whereby the sprayer is literally covered with paint from head to foot before the work day is over. With airless spray painting, this is completely eliminated.

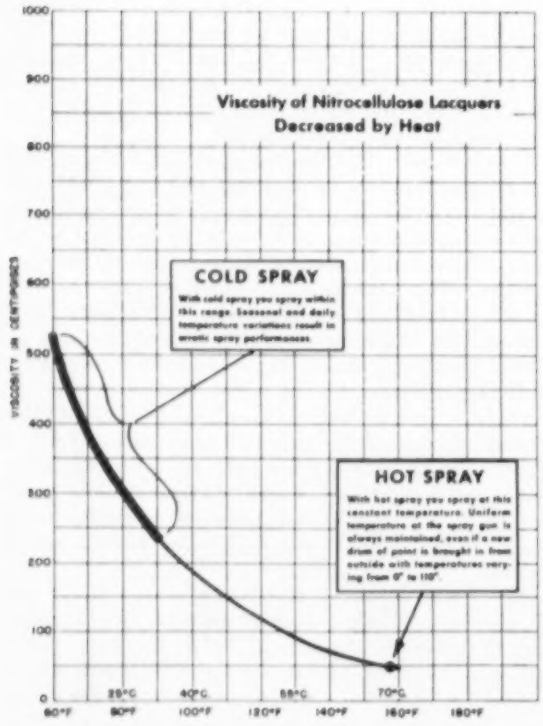
A further important benefit is the elimination of a need for a huge exhaust system in a spray booth. We still recommend the use of a booth with a slight exhaust, sufficient to take out of the spray area the solvent fumes released by the spraying operations. Because no paint particles are blown out of the building, water wash systems can be completely eliminated. Furthermore, because the paint particles are confined to one area the cleaning and maintenance of the spray booth is very greatly simplified.

The finish can be highly improved. For example, a heavier film thickness can be achieved in one operation. This is due to the fact that we not only can spray a heavier higher solid content mixture but also in the spraying operation we dissipate a greater percentage of solvent from the atomized particles. With regular cold spraying from 5 per cent to 10 per cent is dissipated in atomization. With airless spray painting from 10 per cent to 50 per cent or more can be expelled. This is very beneficial provided the remaining solvents properly carry the burden of flow-out. With this process an exact film thickness can always be achieved. Furthermore, in many cases the heated paint particles result in a better flow-out with a higher gloss and a generally better quality finish. Since only a small amount of air is pulled into the booth, not as much dirt is pulled across the freshly sprayed surface. These and many other benefits can be achieved.

Many users of airless atomization process report that the paint adhesion was noticeably improved using the same paint they formerly sprayed cold. This is probably due to two separate factors. One is that for the first time a truly hot spray was achieved. The paint particles hit the surface in a definitely warm state since they are not cooled off by the expansion of compressed air. The heated paint particles therefore have better capillary action and penetrate into the microscopic cavities of the surface to a better degree. The second factor is that the heated paint will dissolve



Graph showing decrease in viscosity of several lacquers as temperature is raised*


Viscosity of Nitrocellulose Lacquers
Decreased by Heat
VISCOSITY IN CENTIPOISES
COLD SPRAY
With cold spray you spray within this range. Seasonal and daily temperature variations result in erratic spray performances.
HOT SPRAY
With hot spray you spray at this constant temperature. Uniform temperature at the spray gun is always maintained, even if a new drum of paint is brought in from outside with temperatures varying from 0° to 110°.
25°C
40°C
55°C
70°C

Graph showing comparison in viscosities between cold and hot spray

*Courtesy Hercules Powder Co.

minute quantities of oil or grease that may be on the surface and distribute them through the film, or float them to the top. In regular spraying the paint particles hit the surface 10° or 20° below room temperature and this cold paint will not distribute or absorb traces of oil on a surface as readily as heated paint would. However, it must not be misconstrued that the author in any matter advocates slackening up on the all-important requirement of a very clean surface to paint. But where it is impossible or impractical to have an absolutely clean surface, this process will enable better adhesion.

MAINTENANCE PAINTING

Widespread demand for this new method of finishing is encountered from maintenance painters, for painting structural steel, ships, trucks, etc. In most cases these are painted under adverse conditions, creating annoyance to all the workers in the area. With airless a heavier, more durable finish is obtained without the paint particles being blown into the surrounding area. It is too early to state at this time, but it is quite possible that this process will come in for a very strong action in the field of domestic painting both for new work and for rework.

This process will greatly benefit every one involved. The manufacturer will benefit because of the conspicuous reduction in costs of operating his paint department, at the same time obtaining a better looking finish. The paint sprayer will benefit because he will be able to do his work in a cleaner, healthier surrounding. The paint manufacturer is benefited because by lowering application costs it cannot help but increase paint utilization and benefit the industry.

PAINT INDUSTRY'S REACTION TO AIRLESS SPRAY PAINTING

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Bede

JAMES A. BEDE

James A. Bede was born in Hungary but attended college in San Antonio, Texas, where he finished his four years of training at the age of seventeen. He has been engaged in paint application problems for the past thirty years and started his own business in 1947. Bede has had over 20 articles on various phases of metal finishing and painting published in leading magazines and is the holder of 15 patents on equipment and processes covering paint applications. He is now engaged in establishing subsidiary branches throughout the world to manufacture and sell paint heaters and airless spray paint equipment.

ELECTROPHORETIC DEPOSITION OF METALLIC AND COMPOSITE COATINGS*

By J. J. Shyne, H. N. Barr, W. D. Fletcher, H. G. Scheible†

INTRODUCTION

Electrophoresis relates to the movement of charged colloidal particles in a liquid by application of an electrostatic field. For example, if two electrodes are immersed in a suspension and a potential applied to the electrodes, a deposit of the suspended material forms on one of the electrodes. Some of the commercial applications of the process are: the deposition of alundum coatings on electronic tube parts to serve as nonemissive electrical insulating material; formation of rubber gloves by electrophoretic deposition of latex; and deposition of a variety of other coating materials, i.e., resins, waxes, graphite, ceramic enamels, metallic carbonates, and metallic oxides.[2] A major application of electrophoresis is the fractionation of biological serums with the Tiselium apparatus; however, this is a field apart from the technique discussed here.[3]

Electrophoretic deposition has been developed at Vitro Laboratories for the application of nickel, nickel-chromium, and nickel-chromium-iron coatings to base metals. Composite coatings of metals and nonmetals, such as copper-molybdenum disulfide, and nickel-silicon carbide composites, have likewise been deposited. Techniques for bonding the coatings have been developed either by (1) deposition of a hydrogen reducible oxide or (2) electrolytic deposition of a metal through pores in the coating.

THEORY

Electrophoresis was observed as early as 1809 by Reuss and given a qualitative explanation by Quincke in 1861; however, it remained for von Helmholtz in 1879 to present a quantitative mathematical theory of electrophoresis. The currently accepted theory was developed by Stern.[7] This theory pictures the particle as surrounded by an electrical double layer, i.e., an electrically charged layer adsorbed on the surface of the particle surrounded by a second outer layer of opposite charge in the liquid phase. The outer layer is of a diffuse nature analogous to the ionic atmosphere in the theory of electrolytes.

The mobility of the particle is related to the potential gradient, dielectric constant, and viscosity of the suspending liquid by the equation:

$$U = \frac{Z E D}{4 \pi \eta}$$

where U is mobility of the particle cm/sec, Z is the particle charge or zeta potential in stat volts, E is the potential gradient in v/cm, D is the dielectric constant of the suspending vehicle in cgs units, and η is the viscosity of the suspending vehicle in cgs units. A complete discussion of the theory of electrophoretic deposition is to be found in the literature.[3,4,5,6]

Electrophoretic deposition has a number of unique features in contrast to electroplating. Greater uniformity and reproducibility of thickness can be achieved, e.g., thickness variations can be controlled to ±0.1 mil. Also, the throwing power is excellent because as the coating deposits on projecting edges the insulating effect of the coating causes the current to shift to remote areas and recesses. As an example, a nickel coating electrophoretically deposited on the root and crest of a screw thread is shown in Figs. 1 and 2. The method is rapid, for example, coatings of 2 to 4 mils thick were applied in 20 to 40 seconds. Due to the short

Fig. 1—Root of Screw Thread

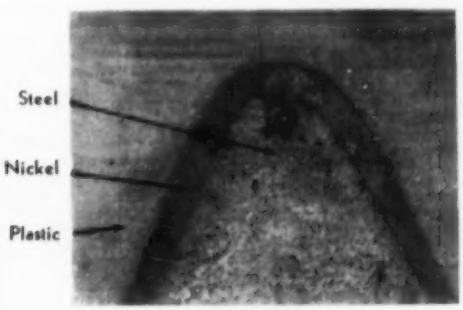


Fig. 2—Crest of Screw Thread

*Presented at the 42nd Annual AES Convention, Cleveland, Ohio. The discussion following the presentation is not included here but will be found in the "Annual Proceedings of the AES, 1955."

†All with Vitro Laboratories, Division of Vitro Corporation of America.

deposition times required, the process is particularly suited for applications requiring a laminated structure. Inasmuch as particles are deposited rather than individual ions, a great deal of material is deposited for a very small current flow. Current densities are in the range from 0.05 to 0.30 amps/sq ft and deposit yields range up to 10 g/coulomb. Since the process is in a laboratory stage, the economics of the process are not known; however, the cost is believed to compare favorably with that of electroplating.

EXPERIMENTAL

The electrophoretic coating process can be divided into three steps: (1) preparation of the coating suspension, (2) deposition, and (3) bonding and densification.

The suspension is prepared by ball milling the coating material in alcohol to obtain a finely dispersed material. Particles ranging in diameter from 0.1 to 44 microns can be deposited; however, a particle size >0.5 micron is preferred, as cracking sometimes results on drying thick coatings of smaller particles. The charge on the particle is acquired during the dispersing operation either because of absorption of ionizable substances or a reaction between the solid and liquid.

Organic liquids are used as suspending vehicles to prevent electrolytic reaction and gassing at the electrodes. The properties desired in a solvent are: (1) low viscosity, (2) low electrical conductivity, (3) low evaporation rate, and (4) high dielectric constant.

The article to be coated is made one of the electrodes in a bath of the suspension. The suspension is agitated slowly during deposition to prevent settling. Cell voltages of 200 to 1000 volts d-c are permissible because the vehicle is an anhydrous solvent. For example, a nickel oxide suspension using electrode voltage of 500 volts d-c will deposit a coating of 4 to 5 mils (60 per cent to 70 per cent theoretical density) in 20 to 40 seconds. An etched or sandblasted surface is desirable to promote adherence when the coating is >1 mil thick. Coating thickness can be varied with deposition time, electrode spacing, voltage, and suspension concentration. Deposition time and voltage are the most convenient variables for controlling thickness. The electrode separation generally used is 1 to 2 inches. Following deposition the coated panel is set by dipping in isopropanol which promotes flocculation of the coating on the substrate. The coating is air-dried and baked to remove the solvent.

Coatings of oxides and oxide-metal powder mixtures deposit in the same ratio as these materials appear in the suspension, i.e., without fractionation. Deposits generally form on the cathode. The deposition polarity depends on the dispersed substance, suspending vehicle and the activator.

Frequently it is necessary to add an activator to the suspension to increase the rate of deposition. The activator is an ionic substance which is adsorbed at the liquid-solid interface and serves to increase the zeta potential. Some of the substances generally used are tannic acid, chromic hydroxide and nickel chloride. The activator substance is added in increments of 0.05 g/l and the coating rate is tested after each addition, because an excess of activator will flocculate the suspension.

A family of curves of thickness vs time for deposition voltages of 50, 75, 100, and 150 volts d-c is shown in Fig. 3. These curves are linear except for a short interval at the start of the deposition. For coating work a voltage is selected so that the desired thickness is in the center section of these curves. Relatively long coating times are undesirable because the coating becomes rough. The deposition curves must be determined experimentally. Faraday's Law is not useable for electrophoretic deposition calculations as the yield varies with the suspending vehicle, suspension age, activator concentration, temperature, and other variables.

A typical curve of time vs current shows an initially high current flow which decreases rapidly to approximately half the initial value (Fig. 4). The decrease in current results either from the resistance of the coating or polarization at the electrode. The resulting insulating effect is responsible for the extremely good throwing power obtained by the process.

CURVE OF TIME vs. CURRENT ◊

CURVES OF THICKNESS vs. TIME ◇

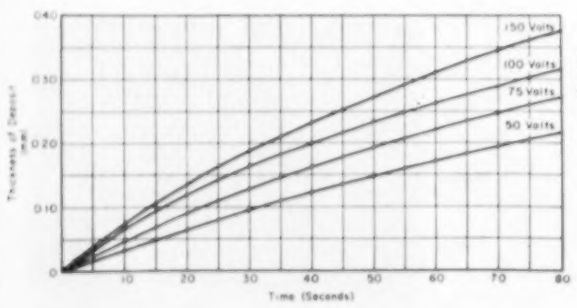
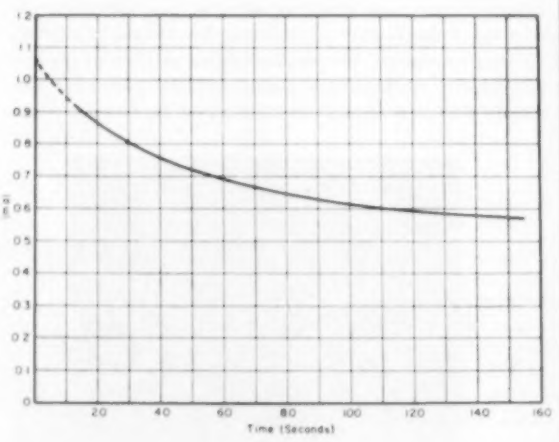


Figure 3



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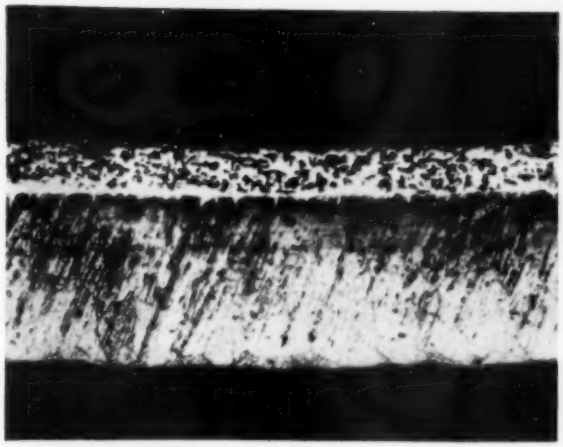

Figure 5

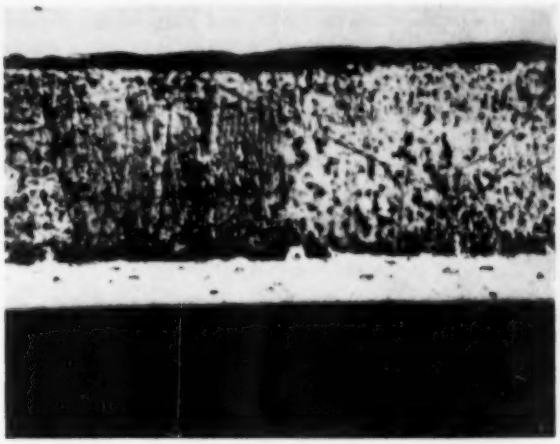

Figure 6

BONDING AND DENSIFICATION

The resultant deposits after drying are not in themselves structural elements because the particles must be bonded together and to the substrate. Conversion to structural members can be accomplished by two techniques: (1) deposition of an oxide which can be reduced with hydrogen, or (2) electrolytic deposition of a metal through the pores of the coating.

1. Bonding by Oxide Reduction—Mechanical properties are secured in electrophoretic coatings of iron oxide, nickel oxide, chromium oxide or their mixtures by firing in hydrogen. Sintering in dry hydrogen reduces the oxides to the metals and effects bonding to the base metal. During reduction the metal is in a highly activated state and consequently sintering is obtained at much lower temperatures than required in powder metallurgy operations. For example, to obtain a nichrome coating on steel, a mixture of NiO and Cr_2O_3 is deposited on the panel. The coated panel is sintered in dry hydrogen at 1100° C. The reduction temperature can be decreased by codeposition of a mixture of nickel oxide and chromium powder. Reduction and sintering of the coating can be obtained at 800° C. The resulting coatings have excellent adherence to the substrate.

   Because of the mode of formation of the coating by oxide reduction, the sintered structure is porous (Fig. 5). A densification treatment is therefore needed if an impermeable coating is desired. Mechanical working techniques such as rolling, ball burnishing and spinning have all been found suitable for densification of the coatings (Fig. 6). Coating 2 to 4 mil thick prepared from oxide mixtures of nickel-chromium and iron-nickel-chromium can be deposited in one application. Coatings greater than 4 mils are difficult to prepare because of shrinkage during the drying and sintering operations.

2. Bonding by Electrolytic Deposition—The second technique for bonding electrophoretic coatings consists of electroplating a metal through the pores of the coating, enclosing the particles and reducing the voids essentially to zero. For example, silicon carbide coatings have been bonded by electroplating nickel through the pores (Fig. 7). Bonding is performed in a nickel chloride plating bath and with conditions adjusted to obtain the maximum microthrowing power. The process has the advantages that high concentrations of refractory are obtained in the resulting structure and that the coating can be applied to a heat-sensitive substrate. No mechanical working or densification is required because the coating is pore-free.

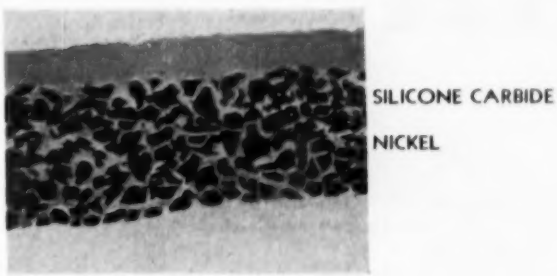

Figure 7

In addition to metal and metallic alloy coatings, cermet and ceramic coatings can be applied electrophoretically. Nonmetallic materials such as carbides and silicides can be codeposited with a reducible metallic oxide to form a cermet coating. Copper-bonded molybdenum disulfide lubricating coatings have been formed by this process (Fig. 8). To do

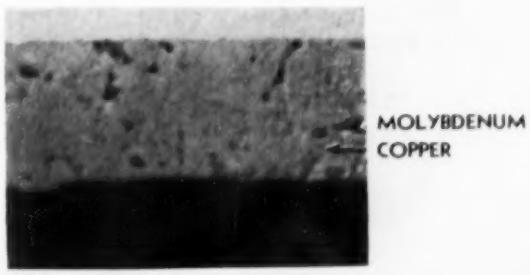

Figure 8

this, a mixture of cuprous oxide and molybdenum disulfide is deposited and by subsequent hydrogen reduction a copper-bonded molybdenum disulfide coating is obtained.

Electrophoretic coating combined with subsequent treatments of the resulting coatings, such as reduction, sintering, or electrobonding to increase mechanical strength or to obtain a desired structure, offers a new approach to the development of an enormously wide variety of composite materials.

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Harold N. Barr attended Alfred University and received a B.S. in ceramic engineering in 1942.

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Harold G. Scheible attended Columbia University and received a BS in chemistry in 1949.

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Wilson Douglas Fletcher attended Hardin-Simmons University receiving a B.S. in chemistry in 1950, Fordham University with an M.S. in 1951 and Stevens Institute of Technology, special courses in advanced physical chemistry from 1952-1954.

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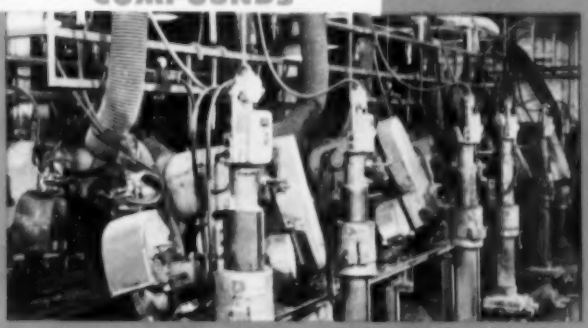

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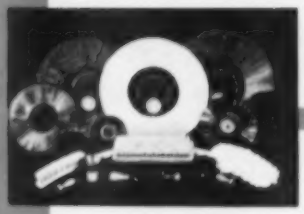

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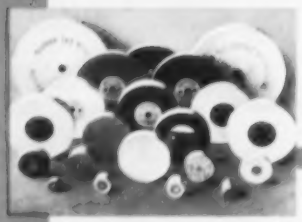

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QUALITIES, PROCESSING AND FUTURE OF PORCELAIN ENAMEL AND CERAMIC COATINGS*

By E. E. BRYANT†

Porcelain enamel is a glass and as such must always have some of the characteristics of glass. The outstanding qualities and color possibilities of the surface are a necessity for many purposes. Improvement of processing methods should greatly increase the use of porcelain enamel for industrial, construction and domestic applications where it is not now a necessity.

ABSTRACT

Porcelain enamel is an inorganic finish fused to metal at temperatures above red heat. In this case red may be defined as 900° F. Fusion varies from 950° F to 1950°F depending upon the metal, type of enamel and purpose or use of the finish. The term "glass" on metal may be more descriptive of the durability of surface.

The term "Ceramic Coating" generally designates a porcelain enamel used for heat resistance or more broadly one not appearing glassy and where appearance is not a predominate consideration.

REVIEW OF PORCELAIN ENAMELS

The history of porcelain enamel goes back many centuries —long before the birth of Christ. The art of enameling is probably of Western Asian origin and there is much evidence that the early Egyptians, Assyrians, Greeks, Byzantines, as well as Chinese and Japanese practiced the art. It spread throughout Europe and England. In many of the large and important Art Museums of this country and abroad will be found porcelain enamel art objects thousands of years old, yet they still retain their sharp outlines and beautiful luster. This all proves the lasting durability and beauty of this finish.

Only porcelain or vitreous enamel could stand this test of time—an important reason why this finish is called "Lifetime Porcelain Enamel."

The metals used for these early art objects were gold, then silver and copper. The first enameling on cast iron (dry process method) was in Bohemia around 1830. Along about 1850 enamels were applied to sheet iron in Austria and Germany. During this period great advances were made in the chemistry of raw materials, as well as important discoveries in the improvement of iron and steel.

*Presented at the 42nd Annual AES Convention, Cleveland, Ohio. The discussion following the presentation is not included here, but will be found in the "Annua Proceedings of the AES, 1955."

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The first porcelain enamel in this country was used on kitchen ware (sheet iron cooking utensils) by Grosjean Company of New York and Vollrath Company of Sheboygan, Wisconsin—this was around 1857 or about 100 years ago.

Kohler Company, Kohler, Wisconsin, was the first plant to enamel cast iron bath tubs. Moore Bros. Company, Joliet, Illinois, sold the first line of porcelain enameled stoves in 1890; these were imported from Germany. Buckwalter Stove Company, Royersford, Pennsylvania was the first company to install its own porcelain enamel stove department; all enamels, equipment and other materials were imported from Germany.

The first refrigerator company to install its own enameling department was Gibson Refrigeration Company, Greenville, Michigan. The first washing machine plant for porcelain enameling was ABC Washer Company, built in 1927.

Today, porcelain enamel is found in many places. The average person is familiar with its use on ranges, refrigerators, washers and bath tubs. A few of the many other applications are signs, architectural, hot-water tanks, chemical food processing equipment, domestic heat exchangers and heaters and light reflectors.

QUALITIES OF PORCELAIN ENAMEL

Porcelain enamel, being glass on metal, is subject to fracture damage, but it is exceedingly more durable than glass in this respect. In certain applications (thin coatings in light gauge metal) a comparative flexible material is produced. Heavy coatings on heavy sections of metal (example—a bath tub) are rigid and require extremely heavy impact to damage the coating.

As a decorative finish porcelain enamel, as indicated previously, is color fast and unchanged in years of exposure to normal atmospheres. In this respect it is the comparison for other appearance finishes even to the extent of the use of names implying porcelain enamel-like qualities. Even the term "enamel" was originally used exclusively for porcelain enamel.

Chemical durability of porcelain enamel will vary widely since formulation is usually adjusted to suit an intended use. Acid resistance of varying degree is possible with the highest resistance being found in chemical processing equipment commonly designated as glass lined. Appearance types of porcelain enamel available today are resistant to acid conditions normally encountered in domestic or architectural use. A high degree of resistance to hot water is possible in porcelain enamels, an example being the present trend to glass lined (porcelain enameled) hot water tanks. Properly selected porcelain enamels will resist mild alkalies as encountered in laundry and dishwasher use. Porcelain enamels will not withstand strong alkali solutions such as 10 per cent caustic soda.

It should be noted that there are requirements of shape and methods of fabrication which may limit the use of porcelain enamels, or necessitate special designs. This is particularly true in the corrosion resistant type of application.

PROCESSING OF PORCELAIN ENAMEL

The basic material is the special glass commonly referred to as "frit" and more recently produced in a flake form. The manufacture of these materials which are supplied and serviced by Ferro Corporation from plants all over the world may be briefly described as follows:

The common materials used are:

Silica	Zinc oxide
Feldspar	Calcium carbonate
Borax	Cobalt oxide
Soda ash	Nickel oxide
Soda nitrite	Manganese oxide
Cryolite	Barium carbonate
Fluorspar	Potassium carbonate
Titanium oxide	Lithium carbonate

. . . there are many others totalling over 50.

These raw materials are accurately weighed out into 2800 pound batches and then conveyed to automatic mixing machines. The batches are dry-mixed for several minutes and then are ready for the smelters. A smelter is a special type furnace, lined with high grade refractory and operated in temperatures ranging from 2200 to 2600° F for most frits.

Frit can be either smelted continuously or intermittently—this depends on several conditions.

In smelting continuously, the raw batch is placed in a hopper on the cold end of the smelter and two water jacketed revolving screw pushers shove the material into the hot smelter. The chemicals melt into a viscous homogeneous glass which moves to the front or discharge end of the smelter. This hot molten glass flows out through a small opening and can be handled in two ways. It can be quenched in a water bath which suddenly cools the glass and breaks it into small particles. Or, it can be dropped in a continuous stream onto two water cooled revolving rolls of about a foot in diameter. These rolls will squeeze the molten stream of glass into a flat sheet of glass 12 to 15 inches in width. This sheet of glass drops down and cools rapidly, breaking up into tiny particles of glass called "flakes."

In smelting intermittently, the molten glass batch is dropped into the water and quenched and then dried.

Porcelain enamel frit or flake is packed in 100 pound bags for shipment.

The frit received in porcelain enameling plants is processed for either dry or wet process application. For dry process (dusting powder on a hot shape) the frit is ground to a powder in a ball mill. This process is at present essentially confined to production of cast iron sanitary ware.

The procedure for wet process is as follows: frit, clay, coloring material if needed, inorganic chemicals for control of suspension and water are loaded into a porcelain block-lined ball mill with porcelain balls. This material is ground to a controlled fineness (in the range of 90 to 98 per cent passing a 200-mesh sieve) and produces a paint-like consistency normally referred to as "Porcelain Enamel Slip" or "Milled Enamel."

A representative charge for a mill would be as follows:

100	Frit or Flake
6	Selected Enameling Clay
1	Color Oxide
¼	Potash Carbonate
⅛	Bentonite
40	Water

The usual method of producing color is to add inorganic coloring oxides or compounds to a clear or white type of frit. In some cases, the cobalt blue color of the frit used for the first coat is used as a finish as found on the interior of cooking ovens. Recently other colors have been introduced into the frit to produce some of the pastel finishes currently available.

White has been the predominant porcelain enamel finish in

recent years, but recent trends have placed strong emphasis on colors. Conventional processing has in recent years generally involved the application of a blue colored ground coat (grip coat) on sheet iron followed by the application of a cover coat for color, corrosion resistance, etc. The processing steps for this process are as follows:

CLEAN METAL SURFACE

A clean, chemically active surface is required on the iron, an etch as produced by acid attack or a blasted surface is desirable. In contrast to this aluminum, copper and noble metals are satisfactory with a polished surface, while stainless steel requires a very rough surface as produced by a sandblast.

Where possible, blasting of an iron surface is desirable. However, conventional processing employs a cleaner pickle system as follows:

1. Cleaner—usually two stages
2. Cleaner rinse—two stages
3. Sulfuric acid 6 per cent—150° F
4. Rinse *p*H 3.5
5. Nickel by replacement *p*H 3.5
6. Rinse *p*H 3.5
7. Neutralizer 0.1 to 0.3 per cent Na_2O—usually two stages
8. Dryer

Steps 5 and 6 assist in adherence of porcelain enamel to the iron.

APPLICATION OF ENAMEL

Ground coat milled enamel is applied by dipping, draining or by spray (the choice depends on shape of part and equipment available) covering both sides of the iron. The water is dried from the coating at 200 to 300° F which is followed by fusion of the coating in a muffle or electric furnace at temperatures in the range of 1400 to 1600° F depending on the composition. Special coatings fire at various temperatures. For example, aluminum is fired at 950° F and heat resistant coating on stainless steel may be as high as 2000° F.

In the conventional process for white or color, the parts which have been fired (ground coat fused) in ground coat are generally sprayed on the face side and dried and fused in the same manner as employed for the ground coat. Dipping of cover coat is used for some items being finished on both sides.

The foregoing is overly simplified since there are various edging, beading off, and handling steps which vary considerably from item to item and from shop to shop. Signs may be produced by brushing patterns following spraying and drying with one application and firing being used for each color. Silk screening, using colors ground in special oils can also be used for lettering or decoration.

The processing of porcelain enamel requires much control of processing and thorough quality control of the finished ware. The Porcelain Enamel Institute (an Association of Porcelain Enamelers) has been very active in establishing numerous standard testing procedures for use in the Industry. An associate is maintained at the Bureau of Standards by the Quality Development Committee of the PEI. Many of the PEI Standard tests are in the process of being adopted as ASTM standards.

For those wishing more detail on the processing and testing of porcelain enamel, a booklet entitled "Porcelain Enameling Operations"* was written by the author of this paper.

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FUTURE TRENDS

At present certain processes are in commercial use and these point up certain trends for the future.

By the use of special steel, cover coats are being applied directly on the iron thus eliminating the blue ground coat. Availability and cost of special steel may limit this application, although attempts are being made to reduce the extra costs on steel for this purpose. This same problem is being approached by special treatment of regular iron in the Porcelain Enameling plant. Two processes show promise, but are not proven commercially. These are Ferro-Republic Pickle Process and Parker Process for application of cover coat direct on iron.

The enameling of aluminum is a proven production process and offers possibilities of permanent color for lightweight structures, elimination of discoloring and protection of aluminum surfaces. Architectural uses would seem to offer the greatest possibilities for porcelain enamel on aluminum. Cut edges of porcelain enameled aluminum will not produce discoloring corrosion as encountered with iron. Lower firing enamels for iron (1250° F) show promise for elimination of some of the design and structural problems associated with conventional porcelain enamels. At this time these low firing enamels would appear to be satisfactory for items where top porcelain enamel quality is not required.

More fully automatic processing of porcelain enamel is coming into use. For example, automatic flow coaters, dipping machines and sprayers have replaced hand operations in several plants and on a variety of items. It appears now that major progress will come from continuous flow processing to avoid handling and manual operations. In this respect it can be shown that synthetic coatings (paint) owe much of their progress to economical production achieved by the automatic processing which has been developed.

The present trend to more automation with materials, equipment and design to suit the unit and process will place porcelain enamel in a truly competitive position cost-wise. Once this position is realized, the outstanding qualities of porcelain enamel will produce a further rapid expansion of the industry.

It can be anticipated that realization of the goal cited here will produce a growth of the industry far exceeding the record of the past thirty years.

E. E. BRYANT

Bryant

E. E. Bryant received his education at Alfred University, where he was graduated in 1931 with a B.S. in Ceramic Engineering. After working several years for the Lisk Mfg. Co., Ltd., he joined Ferro Corporation of Cleveland in 1936 as a Research Engineer. He became Director of Ceramic Research in 1942, Director of Enamel Development in 1949 and received his present post as Technical Director, Frit Division, Ferro Corporation, in 1951.

Bryant is an active member of the ACS, a Fellow of the Society, member of the Institute of Ceramic Engineers, and has contributed numerous papers to the technical literature of Porcelain enameling.

THE FLOW COATINGS OF ORGANIC FINISHES*

By E. A. ZAHN†

INTRODUCTION

This manuscript is prepared primarily for the purpose of causing recognition of the great need for new economical automatic industrial painting methods capable of producing high quality finishes.

There are numerous new methods of paint application available and under development. Each new, and in fact, each old or present method has its proper place in industry. One single method cannot possibly perform for all applications.

Some manufacturers are more fortunate than others with respect to exploring new methods. New quarters are always an incentive to review both equipment and methods. The greatest single factor responsible for the existence of antiquated methods is lack of floor space.

This manuscript is devoted primarily to further the exploration of the so-called low-pressure flow-coat method of paint application for industry. This method, in the opinion of the author, incorporates the best opportunities for the greatest gains in application economy and the improvement in the quality of the applied finish. At the same time, in the opinion of the author, it incorporates the very highest utilization possibilities.

The flow-coat method of painting is possibly, if not actually, the oldest method of industrial painting. For many years, general industry has followed in the footsteps of automotive production methods. The early Model "T" Fords were flow-coated. There was certainly no question about the quality of appearance. The black enamel was flow-coated by the low pressure method, utilizing a moving conveyor. The ever famous early Dodge cars, with their very durable black japan finish, were flow-coated by the low-pressure method. These finishes were both durable and beautiful.

The flow-coat method of painting has never been out of the picture entirely. It could be found in many remote places and usually of the home-made variety. It has also remained on some important products such as outdoor transformers. Here, there just was no other feasible means of applying paint to result in complete coverage and protection. The work object was so intricate in design and so large that no other economical means of application remained and it is still being used for this purpose.

*Presented at the 42nd Annual AES Convention, Cleveland, Ohio. The discussion following the presentation is not included here but will be found in the "Annual Proceedings of the AES, 1955."

†Major Appliance Div., General Electric Co., Louisville, Ky.

There have been numerous attempts made through the years to revive the process with very little success. Some manufacturers have spent large sums of money on installations that were never able to operate. Some dismantled them and wisely so, while others used their new flow-coaters merely as tunnels for the work to travel to new spray booths. Some have failed to operate due to lack of knowledge of solvent requirements and the method was unjustly condemned.

The development and use of pyroxalin lacquers was perhaps the greatest single contributing factor in discontinuing the use of the flow-coat method of painting thirty years ago. In fact, lacquers were the primary cause for the development of the spray gun which became and remains as the accepted method of industrial paint application for the past thirty years. A very worthwhile percentage of industrial finishes are presently being applied by spray in its original form and its many new versions.

The flow-coat method of painting has numerous advantages which very definitely outweigh the disadvantages. It can be and usually is completely automatic. Very little space and very little liquid paint are required with the process. It is light in weight and can be located on mezzanine level or it can even be suspended, thereby saving very valuable floor space. At one time, flow-coating installations were considered to be a fire and explosive hazard. This is definitely no longer true and many of the safety values of the method have been recognized. Hazard control requirements have been completely revised within the past two years. As a matter of fact, a well made flow-coat installation is considered to be much safer than some of the other application equipment installations.

A new era in industrial coating application is presently unfolding. The suddenly recognized need for method economy has brought flow-coating back into the industrial picture and its use is growing by leaps and bounds in popularity. The potential list of flow-coating equipment suppliers is exactly as long as the total industrial equipment supplier list. Not all, however, are considered efficient since experience and a good knowledge of coating materials are essential to designing good flow-coating equipment.

Equally long is the list of new users of this method of painting. The entire major appliance industry uses the process in place of previously used method. Almost the entire farm equipment industry, the room cooler manufacturers, metal furniture manufacturers, toilet seat manufacturers and many others have or are adopting the method within the past three or four years. The process is not limited to work part size. One user is painting eleven foot panel sections and another is painting twenty foot channel sections by the flow-coat method. Automotive manufacturers are presently giving serious consideration to the use of the flow-coat method of paint on body skeletons. Hoods, fenders, trunk lids, stone deflectors, wheels, etc., have long been coated by this method.

One of the outstanding features of this new process is that it is easily inter-connected in full automatic cleaning, painting and baking processes.

It is true that increase in the flow-coat method of painting has materially affected the volume of industrial paint sales and it will be further affected. It is fortunately true, considering that up to fifty per cent of the purchased volume of industrial paints had previously been wasted. The industrial user can afford to pay a little more for better materials and profit by a higher quality product. The present day synthetic materials lend themselves more definitely to flow-coating. New solvents in a great range are available until there is virtually no end to the possibilities of flow-coat application.

The quality of the film produced by the flow-coat method is unquestionable. There is no other method capable of producing a better film. Special formulations of paint are not necessary for adaptation to the flow-coat process. Special solvent adjustments are necessary. Special solvent formulations are necessary for all methods of application, if the best possible results and economy are to be obtained.

When a decision is made to use the flow-coat method of application great caution should be exercised. Complete cooperation between equipment supplier, user and paint supplier are absolutely necessary. Cooperation within the user's organization is vitally important. It has been said, and perhaps not unwisely, that major problems are divided to result in a ninety per cent people problem and only ten per cent equipment and material problem. Lack of experience with the process is often a lesser hazard than a divided opinion within an organization as to its value.

While it is generally not necessary to design or re-design products to lend themselves to the flow-coat method of application, cooperation of the designer is of great value. A product can be designed and a suitable hanger can be designed for it, but since it would be illegal to hang the designer, it would be better to cultivate his cooperation so that the design of the work hanger need not be too complicated.

Past experience indicates that when one ventures into the field of this undertaking, he should be sure to build his band wagon long and strong. There never seems to be room enough for all who want to ride when the process proves successful. Up to the point of actually putting a new process into industrial use, it is usually called the engineer's nightmare. When it works, and it usually does, the celebration will include every one who has been remotely connected with it, regardless of their previous attitude.

E. A. ZAHN

E. A. Zahn has spent twenty-six years in research on industrial paints and application-methods and is well qualified to write a book on "Flow-Coating."

He is the inventor of the Zahn Viscosimeter and has acted as consultant to many manufacturing concerns. In 1938 he received the Charles A. Coffin award for contributions made to the electrical industry. Zahn has been associated with General Electric for twenty-six years, and is at present Organic Finishing Engineer at General Electric's new Appliance Park, Louisville, Kentucky.

ELECTROLESS NICKEL PLATING OF NONCONDUCTORS*

By PHILIP H. EISENBERG and HAROLD C. SCHNEIDER†

ABSTRACT

Electroless nickel was used to plate nonconductors having varied geometry. A description is given of the cleaning and etching cycles as well as the plating solutions used. Data are presented concerning plate adherence, deposition rates and solution control. Included in the paper are the results of microscopic examination of the plated nonconductors.

INTRODUCTION

In conjunction with metal-to-ceramic seal work at Sylvania, a number of nickel-plated ceramic discs were prepared. At that time it was felt that electroless nickel plating might be used as a bonding agent to help effect a metal-to-ceramic seal. Upon undertaking this project, it was soon discovered, as in all deposition work, that surface preparation was all-important. When the surface preparation problems were solved, it was consistently possible to deposit an adherent, uniform nickel coating onto the nonconductors.

A survey of the literature revealed the techniques presently being used to metallize nonconductors. Dr. Harold Narcus[1] cites: (1) chemical reduction; (2) mirror-spray; (3) metal evaporation as the most successful methods for the metallization of nonconductive materials. The chemical reduction method is given as the procedure most commonly employed today. He further states that the nonconductors are rendered conductive by chemical reduction and then are subsequently electroplated. Silver appears to be the most common metal that is chemically reduced onto the surface of the nonconductors. The procedure outlined by Dr. Narcus is as follows:

(1) Slight roughening or deglazing the surface.

(2) Degreasing in a proprietary immersion cleaner.

(3) "Sensitizing" the surface in a stannous chloride solution.

(4) Reducing a silver film on the surface with the use of a formaldehyde solution.

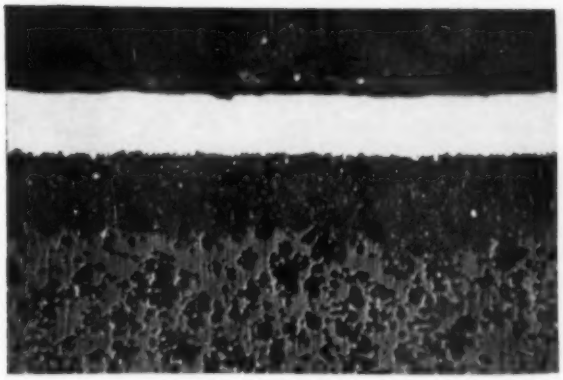
(5) Electrodeposition of an intermediate layer, e.g., copper.

(6) Application of the final layer.

At a later date, interest developed in the possibility of plating nonconductive powders. It was felt that it might be possible to form materials comparable to cermets. The literature disclosed only one investigator in this field, Dr. J. E. Cline.[2] Molybdenum was deposited from the vapor phase onto ceramic particles in a fluidized bed.

*Presented at the 42nd Annual AES Convention, Cleveland, Ohio. The discussion following the presentation is not included here but will be found in the "Annual Proceedings of the AES, 1955."

†Sylvania Electric Products, Inc., Hicksville.



II. THE PROCEDURE

A. *Preparation and plating of the nonconductor*

The method to be presented may be classed as chemical reduction. The procedure developed is:

(1) Degreasing by immersion in an alkaline proprietary solution.
(2) Chemical etching in solutions suitable for the nonconductor.
(3) "Seeding" the surface.
(4) Electroless nickel plating.
(5) Possible application of further electrodeposits.

Degreasing and etching solutions varied with the nonconductor. The end result was a surface that was chemically clean and uniformly etched. The alumina surface shown in Fig. 1 at 300X was degreased in a steel type cleaner and was etched in a sulfuric-hydrofluoric acid solution. It may be noted from Fig. 1 that the plating was initiated in the etched region within the alumina and then continued to the surface. Fig. 2 at 1000X clearly illustrates the excellent microthrowing power of the electroless nickel plating bath.

In much the same manner for example, individual alumina particles, minus 325 mesh, were nickel plated and were cold pressed. Some attempts were made to sinter this type of compact but initial results reveal that more work is necessary along these lines.

The seeding solution was a 150 g/l solution of sodium hypophosphite operated at 90° C. When the pores of the nonconductor had absorbed the reducing solution the piece being plated was placed in the electroless nickel plating solution and was plated to the desired thickness.

The electroless nickel plating solution used was selected from a group of solutions developed by Dr. Abner Brenner.[3] The plating solution composition is as follows:

Nickel sulfate	30 g/l
Sodium acetate	10 g/l
Sodium hypophosphite	10 g/l
*p*H	4–6
Temperature	80–90° C

Contrary to other reports[4] this plating solution was found to be satisfactory. When the usual plating solution controls were used, the plating bath remained stable and produced consistently good nickel deposits.

B. *Electroless Nickel Solution Preparation*

The stability of the plating solution can be related directly to our good housekeeping technique used in solution make-up and control. In all this work an attempt was made to use as good a grade of chemicals as was possible. The chemicals used had the following specifications:

(1) Nickel sulfate—technical grade (low copper—Fig. 3)
(2) Sodium acetate—ACS specifications
(3) Sodium hypophosphite—NF IX grade (Fig. 4)

The make-up water used was demineralized and had an ionic content of less than one ppm expressed as sodium chloride.

To make up the plating solution the following procedure was used:

(1) The nickel sulfate and the sodium acetate were dissolved and well agitated. The temperature was raised to 80° C and the solution was agitated for an hour or more after the addition of four pounds of activated carbon per hundred gallons of plating solution. The solution was allowed to stand hot without agitation over night.

(2) A filter cake was prepared as outlined in "Practical Nickel Plating"[5] by using 2 oz of filter aid per square foot of filtering area. The electroless nickel solution was then filtered through the filter cake and into the plating tank.

(3) A room temperature solution of sodium hypophosphite was then added and the solution was ready for plating after the temperature was adjusted.

The purification method used was selected because of its simplicity and effectiveness. The nickel sulfate-sodium acetate solution has a *p*H (about 6) at which most inorganic impurities are insoluble. When these insolubles are filtered in the presence of carbon the adsorbed organic impurities for the most part are also removed.

It is the authors' belief that the resultant clean solution is rendered more stable by the purification procedure.

Because of the need for good temperature control as well as uniform heat distribution, constant temperature baths were used to heat the plating solutions.

FIGURE 3—

Chemically

Nickel	22.3 per cent	Copper	0.0004 per cent

Spectrographically

Antimony	Slight	Aluminum	Nil
Thallium	Nil	Cadmium	Medium
Magnesium	Slight+	Copper	Low+
Manganese	Medium Low	Indium	Nil
Lead	Low	Cadmium	Nil
Tin	Nil	Zinc	Nil
Silicon	Trace	Silver	Nil
Chromium	Nil	Arsenic	Nil
Iron	Low	Tellurium	Nil
Bismuth	Nil	Mercury	Nil
Cobalt	Slight		

FIGURE 4—

Sodium Hypophosphite, N.F. IX Grade

Color	Pure white crystals
Odor	None
Assay	Shall not contain less than 98.0 per cent $NaH_2PO_2H_2O$
Alkalinity	A 10.0 gram sample dissolved in 100 ml of neutralized water shall not require more than 15.0 ml of N/10 H_2SO_4 to neutralize to methyl orange
Arsenic (As_2O_3)	Not more than 10 ppm
Insoluble in water	Must not exceed 0.05 per cent
Calcium (Ca)	Must pass N.F. Test
Heavy Metals	Must pass N.F. Test
Phosphate (PO_4)	Must pass N.F. Test

III. ADHESION

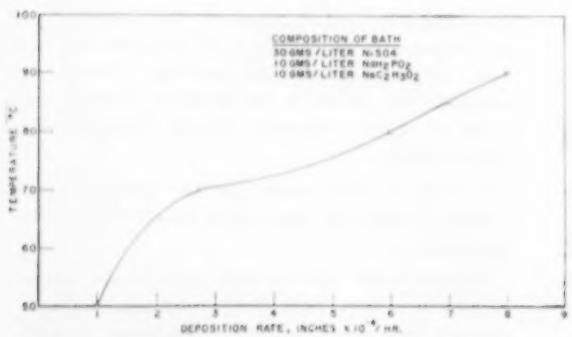
Adhesion of the nickel plating to the nonconductor was judged qualitatively. The procedure used was as follows:

(1) A number 16 copper wire was soldered to the nickel plate.

(2) The plated specimen was firmly clamped and the wire was pulled perpendicularly to and away from the nickel.

(3) If no separation occurred between the plate and the nonconductor before the base material deformed or broke, the adhesion was deemed satisfactory.

FIGURE 5—



IV. DEPOSITION RATE

A series of closely controlled experiments were run to determine the effect of temperature upon the plating rate. The curve in Fig. 5 represents our findings which substantiate previous investigations. Eighty to 85° C was chosen as the optimum operating temperature because the plating bath life decreased at higher temperatures.

V. SUMMARY

(1) Nonconductors were uniformly coated with electroless nickel plate after etching and seeding.

(2) Nonconductive powders (−325 mesh) were nickel plated in a similar manner.

(3) Solution temperatures, concentrations and cleanliness were closely controlled in order to achieve the above results.

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P. H. EISENBERG

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ORGANIC COATINGS FOR ELECTROPLATERS

By WAYNE R. FULLER*

SYNOPSIS

This paper discusses the transparent product finishes, clear and colored, that are of interest to electroplaters. After balancing the properties of the various synthetic resins against the requirements of the particular job, the finish chemist usually develops a formula containing two or more resins. The resin types mainly employed are: alkyd, amino, phenolic, epoxy, methacrylate and cellulose acetate butyrate. There is discussion of the types of coatings most suitable for different conditions of service and for use on chrome plate, solid brass and brass plate and aluminum.

While concerned primarily with metallic coatings, electroplaters require a variety of organic coatings. They serve two main purposes: (1) protect equipment, such as racks and tanks, against plating solutions, (2) protect and decorate the manufactured product. This paper will deal only with transparent coatings, clear or colored, for the latter purpose. Since many companies that do electroplating also fabricate metal products that are not plated, the paper will not be confined to finishes for use over electroplate but will cover some other non-ferrous surfaces.

Each time a new synthetic resin is introduced its good features are given wide publicity. There is a tendency for users to assume that they are behind the times unless they switch to finishes based on the new resin. Each resin has weak points as well as strong points. There is no perfect resin, just as there is no perfect coating. A new type of resin may or may not be advantageous in the finish for a particular purpose. The finish chemist balances the properties of the various resins against the requirements of the job. These requirements vary greatly, depending on the kind of metal, method of application, baking schedule and service conditions to be met. The chemist designs a series of experimental formulas. These are subjected to comprehensive tests that are planned to simulate conditions of use and service. In most cases the test results indicate the need for a second series, and a third or fourth series may be required. When finally the formulator is ready to submit a product to the user the chances are that it contains not a single resin but a blend of two or more. Today there is such a wide choice of basic resins that two formulators might produce the same performance properties with substantially different formulas.

The ultimate concern of the user is performance properties, not composition. At the same time it is only natural and proper that he should take an interest in composition and want to know what type of coating he is using. In order to gain an understanding of composition it is necessary to begin with a brief discussion of the properties of the main types of resins that are employed.

First in importance are the oil modified alkyd resins. The individual resins within this group vary considerably in properties but in general they impart flexibility, toughness and exterior durability. They lack high resistance to humidity, salt fog, chemicals and abrasion.

The amino resins (urea- and melamine-formaldehyde) are distinguished by fast baking, hardness, brittleness and very pale color. They are used in combination with other resins, most often alkyds.

Although there are several types of phenolic resins, only the alcohol soluble, heat-convertible resins require consideration here. They impart hardness and high resistance to humidity, salt spray and chemicals. On the negative side they are brittle, dark in color, require a high baking temperature and are compatible with only a limited range of other resins.

The epoxy resins that have greatest utility for the coatings under discussion must be combined with other resins in order to develop their characteristic properties by cross linkage during baking. Amino resins are commonly used for this purpose. The epoxy resins possess excellent adhesion, flexibility, toughness and resistance properties. They have good hardness and fair color.

Methacrylate resins differ from those previously mentioned in that they are thermoplastic in type. Film formation is effected solely by solvent evaporation, without conversion as in the other types. Although baking is not required, it improves flowing and adhesion. The methacrylate resins have good adhesion, good flexibility, good toughness, extremely pale color and good exterior durability. Their main deficiencies are in hardness, resistance properties and build.

Cellulose acetate butyrate, another thermoplastic resin, is a somewhat recent addition to the formulator's kit. It has excellent flexibility and color. Adhesion and build are poor. Humidity resistance is only fair and indications are that weathering properties are only fair.

Another recent development is a formulation based on a blend of a special silicone resin with ethyl cellulose.

Let us turn now to the application of these resinous film formers to specific problems.

During the period of critical shortage of nickel it was necessary to apply a clear organic coating on the chrome plated zinc die castings used for automobile trim. The coatings first employed were combinations of alkyd resin and amino resin. When applied over a properly cleaned and conditioned surface, the better finishes offered good adhesion and excellent resistance to moisture, salt and abrasion. On prolonged weathering they had a tendency to check, crack and finally to scale. Refinishing presented a serious problem because they were extremely difficult to strip and required baking. As a result auto manufacturers turned to methacrylate finishes, which had better exterior durability, could be stripped with toluol or lacquer thinner and did not require baking. In some cases the hardness of the finish was improved by incorporating nitrocellulose.

While clear organic coatings are no longer required for protection of the chrome trim on autos, transparent colored finishes are widely used on the chrome trim and fittings of appliances. In this case weather resistance is not a factor. Alkyd-amino resin combinations have proved of widest utility. The formulation of the finish must conform to the maximum baking temperature that can be employed without blistering the chrome plate, the range for various parts being 200 to 300° F. Broadly speaking, higher temperatures and longer bakes permit better coatings. When the temperature must be no higher than 225° F. it is advantageous to incor-

*Director of Research, Grand Rapids Varnish Corporation.

porate a mild acid catalyst in the reducer to accelerate the conversion of the urea-formaldehyde portion of the resin. In this way schedules of 15 to 30 minutes at 200° F produce good results for decoration of exterior auto trim.

Today most of the transparent finishes that are being applied on chrome plate are colored. Gold, blue and other transparent colors are widely used on appliance hardware, trim and fittings. The coloring agents are relatively transparent pigments, which are fast to light, fast to baking temperatures and withstand weather exposure.

Clear baked finishes are applied on brass builder's hardware, which is usually solid brass. In the past phenolic resins, perhaps combined with other resins, have been widely used because they afforded excellent protection against moisture and perspiration. Application was by dipping or spraying. It was necessary to apply a thin coating to avoid discoloration and also because the inherent brittleness of the resin is less serious in thin coats. The finish left considerable to be desired in length of protection, especially when exposed to the weather. Epoxy resin in combination with urea-formaldehyde resin appears to offer a definite improvement. The paler color and better toughness permit the application of as thick a film as is possible without obtaining an objectionable coated appearance, in the range of 0.3 to 0.5 mils. The result is enhanced adhesion, toughness and exterior durability. It is not feasible to obtain this greater film thickness in a single dip coat, because of the shape of the parts. Hand spraying would produce non-uniform, incomplete coverage. A satisfactory solution to the problem of application is offered by airless, electrostatic spraying. A baking schedule of 20 minutes at 350 to 360° F in a convection oven is adequate for curing.

The epoxy type finish that gives best results on solid brass is unsuitable for lower baking temperatures, as a high temperature is essential to good conversion. This eliminates it for use on brass plated zinc die castings, which can not safely be baked above 270° F. Two types of finishes that have given good test results on this surface are an amine catalyzed epoxy resin and a combination of phenolic resin with a smaller amount of urea-formaldehyde resin. The former can be either air dried or baked but the latter requires baking at a minimum temperature of 270° F. Nitrocellulose lacquer containing an alkyd resin is being used on some solid brass and brass plated builder's hardware. It can be either air dried or baked 10 minutes at 200° F. While such a lacquer has good adhesion and toughness it does not afford as long protection as the newer finishes. Judging from results on aluminum, it seems probably that a judicious combination of alkyd, methacrylate and melamine-formaldehyde resins would give excellent protection to brass.

The expanding use of aluminum as a material of construction lends added weight to the problem of clear finishes to protect it. Sheet aluminum is widely used for the exterior of mobile houses. A clear finish serves both to maintain an attractive appearance and to prevent smudging when there is contact with the surface. Some trailer manufacturers are considering the adoption for feature strips of a very bright sheet produced by electroplating aluminum on aluminum. Because of its very smooth, "greasy" surface this material increases the difficulty of obtaining good adhesion, necessitating extra careful selection of the finish. Aluminum window frames require a clear coating to prevent the alkaline mortar from attacking the metal. In this case the protection needed and expected is temporary and air drying lacquers prove satisfactory.

The aluminum products for interior use, e.g., lighting fixtures, lamp shades and novelties, present no serious problem of protection. There is considerable latitude for choice between methacrylate lacquer, cellulose acetate butyrate lacquer, nitrocellulose lacquer and baked finish of the alkyd-amino resin type. However, more critical selection is called for when the finish is exposed to the weather or other severe service conditions. The latest development is a baked finish containing a carefully proportioned blend of selected alkyd, methacrylate and melamine-formaldehyde resins. This finish has given outstanding performance in weather and salt fog exposures. A baked alkyd-amino resin finish also gives good results. Of the air drying finishes lacquers of the methacrylate and cellulose acetate butyrate types appear best.

It is well known that when an opaque finish is applied on aluminum its exterior durability is greatly increased by suitable chemical conversion treatment of the surface. The best proved treatments discolor the metal and, therefore, can not be used for transparent finishes. With a view to meeting this situation special treatments have been developed that do not change the color of aluminum. Tests have indicated that the value of these treatments is questionable.

One of the recent developments in clear coatings for non-ferrous metals is an air drying finish based on a modified silicone resin and ethyl cellulose. It is reported to offer longer protection than other lacquer type finishes on chrome plate and aluminum. Probably it would also be suitable for other non-ferrous metals. It is low in solids and high in cost.

When users are seeking better performance of a finish, they are prone to give attention almost exclusively to the search for a better coating material. Other factors may be of equal importance and should be investigated along with coatings. Metal preparation should always be given careful study and adequate provision made for it. The protection afforded by any organic film is roughly proportional to its thickness. It is essential that the finishing process be planned and controlled in a manner that assures a uniform film of the thickness required for the job. Finally, it should be recognized that heat convertible coatings develop their inherent protective properties only when baked on a schedule that produces complete curing.

Patently the past few years have brought forth no single advancement that is sensational or revolutionary in character. They have, however, been a period of steady improvement by refinement and more precise adaptation to end use. Now on the horizon are polyester and isocyanate type finishes. Conceivably these compositions could create new and higher standards of performance for organic coatings. The next few years should tell.

WAYNE R. FULLER

Fuller

Wayne R. Fuller received a B.S. degree from the University of Missouri. Following a year of graduate work and service in the Army during World War I, he entered the paint industry. He has held administrative technical positions with four nationally known paint manufacturers. For the past 15 years, he has been Director of Research for the Grand Rapids Varnish Corp. He has been active in the ASTM, is past chairman of the Division of Paint, Varnish and Plastics Chemistry of the ACS and is an author of numerous papers on paint problems.

Courtesy of Lukens Steel Co.

STRIPPABLE STOP-OFF COATINGS

By Myron C. Bryant*

One of the fastest growing plating-room techniques is the use of specially-formulated strippable stop-off coatings for selective masking of metal surfaces prior to electroplating operations. This time-saving, cost-cutting innovation has many advantages. And, like all improved techniques, it has definite limitations. But on balance strippable stop-offs have so many practical applications that their attributes should be better known to electroplaters generally.

First, the background.

Strippable coatings for industrial production use are a direct outgrowth of a basic, organic-chemical development to meet a very specific urgent need during World War II. American plane production swung into high gear without prior provision for delivering thousands of fighter-planes to far-flung fronts. Bombers could be flown overseas. But fighter planes had to be shipped as deck cargo. Quickly removable, interim protection was imperative. Slushing oil and grease took time to apply . . . still more time to remove at a remote forward air base. Urgently needed was an impervious plastic coating that would cling tightly, withstand every conceivable exposure in every possible climate yet be freely strippable months later. No such coating had ever been mass produced. As frequently happens, the "impossible" problem was solved by a fledgling industrial finishes producer through the development of "Liquid Envelope."[1]

Because it did a job, millions of gallons of this protective coating were used to "package" military equipment enroute overseas. After the war, many more millions of gallons were (and are still being) used to "mothball" Navy ships, planes, ordnance, vehicles, etc.

Substantial military use of the plastic, strippable coating attracted industrial users, first for protective "packaging" and later to protect work-in-process during stamping, forming, bending, machining and assembly operations, from which the use of the material spread to electroplating through its adoption by the electroplating department of a steel mill.

The Lukens Steel Company at Coatesville, Pa. developed Lukens Clad Steel as an economical alternate for heavy stainless steel or monel metal plate. Lukens Clad Steel is a composite ("sandwich") plate comprising a carbon or alloy-steel filler onto which a face of corrosion-resistant metal sheet is inseparably bonded by heat and pressure. The contact surface of the "filler" and the "face" are first nickel plated to assure a perfect bond before the "sandwich" is hot rolled into one integral piece. Since only the contact faces of these large plates require electroplating, a stop-off was needed to prevent plating on the reverse side. Subsequent strippability was essential.

After testing many materials, Lukens tried a strippable protective coating formulation which had never before been thought of or tried as a stop-off coating. First trials were encouraging but hardly spectacular. But after adjustments in the formulation a suitable modified vinyl polymer was developed and trade-named "Liquid Envelope" Stop-Off No. 3320.

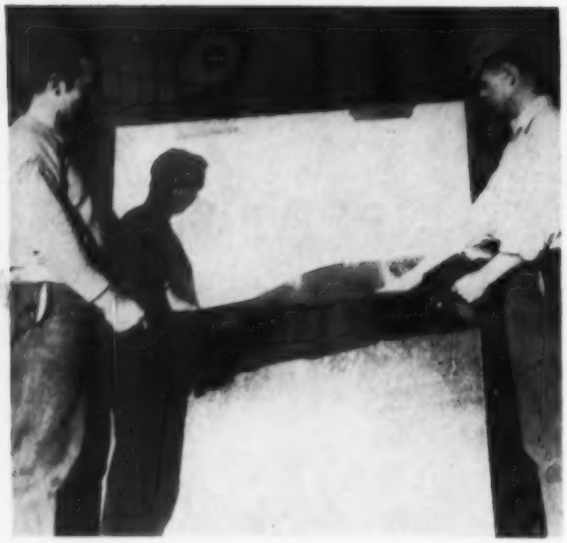
The grapevine spread the word on Lukens technology and other platers became interested. But, as might be expected, quite a few operating difficulties had to be overcome by changes in the formulations and the development of new strip coatings. Not all operating conditions have been licked but very substantial progress has been made. Electroplating use of strippable stop-off coatings is growing very fast indeed.

With this fundamental background, let me describe strippable stop-off coatings, how they are used and what their limitations are. Doing this should answer the questions most frequently asked by electroplaters.

Strippable stop-off coatings, are modified vinyl polymers containing resins, plasticizers and modifying agents in an organic solvent vehicle. They are "high-solids" formulations which dry to form a dense, impermeable tough film with ad-

*President, Better Finishes & Coatings, 268 Doremus Ave., Newark, N. J.

[1]Trademarked by Better Finishes & Coatings.



hesion regulated within narrow limits. While these coatings are resistant to most acids and alkalis, they are not created to be corrosion-resistant coatings. They will not, for instance, retain their calculated adhesion if immersed for long periods in hot alkali solutions. But in normal electroplating shop operations, their physical characteristics are completely satisfactory.

When dry (i.e. "set"), stop-off coatings are impervious to nickel, chromium, copper, brass, bronze, alloy and precious metal plating solutions.

Stop-Off 3275[2] is a general-purpose sprayed-on stop-off that has the physical properties and adhesion found to be most acceptable throughout custom and job plating shops. It is not adversely affected by usual bath temperatures. A 3-5 mil film is usually sprayed on and manually stripped after plating operations are completed.

Stop-Off 3320 is an unusual coating especially suggested for masking rough metal surfaces, such as coarse clad steel, during electroplating operations. It is a high-solids formulation with adhesion regulated so as to be freely strippable from rough, porous surfaces. Spray application to produce a dry film of 3 to 5 mils in one application amply protects surfaces in the plating bath. The film strips freely after plating operations.

Stop-Off 6626 is a formulation which can be applied by brush or dip coating, as well as by spraying. Although high-temperature stability is not of prime importance to electroplaters, this material will withstand two 10-minute baking cycles at 375° F and still be freely strippable. Its versatility would be valuable in a shop doing both organic finishing and electroplating as a strippable masking material and as a stop-off.

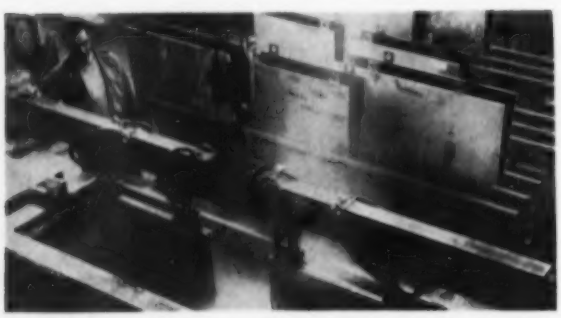
Spray gun application is the most economical of time and material particularly in connection with mass-production plating equipment. With the proper spray gun set-up a very sharp line of demarcation between the coated and uncoated surfaces can be obtained. Dip coating is perfectly practical and usually the most economical for small runs. Brush application of No. 6626 is being done in many shops. In using this method a longer drying time is usually required because of the tendency to brush on a coating heavier than the recommended 3 to 5 mils thickness. Also a sharp line of demarcation is harder to achieve with brush coating because the coating is a heavy viscous fluid and tends to "pull" unless brushed on skillfully in a thin coat.

At room temperature strippable stop-off coatings dry as fast as a lacquer coat. Normal drying time to touch is 3 to 5 minutes, to handle 30 minutes. For mass production operations a very simple infrared force-dry set up reduces drying time to handle to less than 2 minutes. It is very important that the dipped or brush coating be absolutely dry, that is, that all the solvent has evaporated from the film. Otherwise unevaporated solvent tends to bubble off as a gas in the pickling or plating solution and to raise blisters in the coating. This may permit small plated spots in the stopped-off area. With spray application in thin (3 to 5 mil) films this difficulty is seldom encountered.

Frequently, prospective users ask if there is any "creeping" of the film. If the film is dry before entering the bath, creeping is not a problem. As initially cited, strippable stop-off coatings are not a panacea. Being new, different and alien to methods and materials currently found in plating shops, they require a certain amount of know-how and experiment before they fit smoothly into the day's work. But if approached open-mindedly they are simple and inexpensive to use and do the job excellently. Their substantial growing use as stop-off coatings during the electroplating of clad steels, special castings, bearings, dies, tools and on various other industrial and consumer equipment parts is ample evidence of their practical value to electroplaters.

M. C. BRYANT

Myron C. Bryant was associated with Sherwin-Williams Paint Co. from 1929–50. He was one of the originators of Better Finishes & Coatings Co. and has been active there in the capacity of Vice-President in charge of Sales. In 1949 he became President of that company and has served in that capacity to the present.



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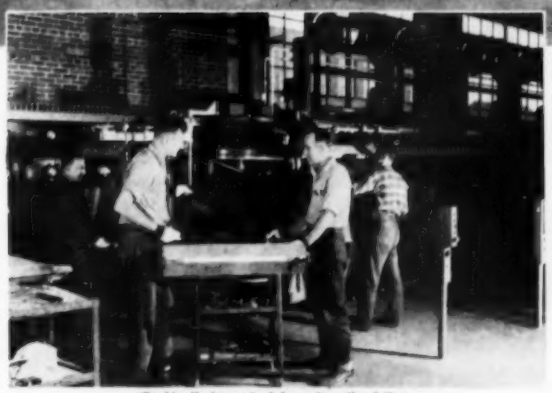
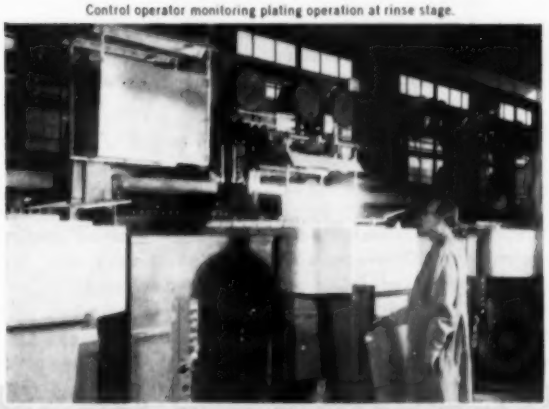


"Racking" of can stock for automatic plating.

Control operator monitoring plating operation at rinse stage.



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Photos courtesy International Nickel Co., Inc.

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IN TEXAS
1113 Perry Road
Irving (Dallas), Tex.
BLackburn 3-4921

Patent Abstracts

DR. D. GARDNER FOULKE

Manager, Electrochemical Development
Hanson-Van Winkle-Munning Co.
Matawan, New Jersey

Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

No. 2,702,252, February 15, 1955—Method of Depositing Rhodium Metal on Printed Circuits—L. Suchoff, assignor to the United States Army.

The method consists of dipping the copper diagram into an aqueous rhodium salt bath to permit immersion deposition of the rhodium on the copper. The bath claimed consists of 10–20 per cent rhodium chloride dissolved in 90–80 per cent of an aqueous solution containing 5–50 per cent of hydrochloric acid at about 80° C.

5 claims.

—AES—

No. 2,702,253, February 15, 1955—Surface Metallizing Method—E. Bergstroem, assignor to Svenska Akteibogalet Gasaccumulator, Lidingo, Sweden.

The invention refers to metallizing various types of surfaces which do not reduce stannous chloride. The steps consist of steeping the surface in an aqueous (acid) tin chloride(ous) solution, rinsing, steeping in a palladium salt (chloride) solution at 60–95° C followed by a final steeping in the salt of the metal which is to form the coating (Os, Sr, Pt, Rh, Ru, Pd, Fe, Co, Ni, Cr, Al, Mg and Mn.)

4 claims.

—AES—

No. 2,702,270, February 15, 1955—Method of Making Fine Mesh Metallic Screens—D. Donahue, et. al., assignors to Radio Corporation of America, Delaware.

A ruled ceramic master plate is coated with a wax composition, a metal (Au, Pt, Pd) is vacuum sputtered on the wax after which the metal and the wax is rubbed from the raised portions of the master plate and either nickel or copper is then plated upon the sputtered metal in the grooves from a cold nickel bath.

8 claims, 8 figures.

—AES—

No. 2,702,271, February 15, 1955—Process for the Deposition of Gold or Gold Alloys—V. Spriter and J. Mermillod, Geneva, Switzerland.

In the disclosure the inventors declare noble metals are the most capable of "retaining" hydrogen which causes porosity of thin deposits and extreme fragility of thick ones. Certain compounds are claimed to remove the hydrogen, i.e., have a great affinity therefore. The claims cover the use of 5 to 10 grams per liter of nitro-guanidine and nitro-urea.

7 claims.

—AES—

No. 2,702,525, February 22, 1955—Apparatus for Coating Wire or Strip with Molten Aluminum—M. Whitfield, assignor to Whitfield and Sheshunoff, Inc., Garden City, N. Y.

A method for coating wire or strip with aluminum consists of introducing hollow fitting or fittings of tubular form into the molten bath connected with entrance channels from an inductance heating device, which guides the molten metal, moving upward by virtue of heating to the exit point of the wire or strip slightly above the level of the molten aluminum. This provides a uniform coating freed of oxides generally surrounding the wire as it leaves the pot.

11 claims, 4 figures.

—AES—

No. 2,702,762, February 22, 1955—Vitreous Enameling Composition and Composition—A. Chester, assignor to Poor & Company, Chicago, Ill.

The method for coating ferrous metals with vitreous enamel includes pretreating the surface with a thin uniform coating of potassium antimonyl tartrate and a chloride of a metal from the group consisting of varium, strontium, manganese and magnesium.

11 claims.

—AES—

No. 2,702, 768, February 22, 1955—Ferrous Surface Coating Process—M. Hyams, et. al., assignors to Parker Rust-Proof Company, Detroit, Mich.

The coating is formed in an aqueous solution consisting essentially of at least one substance selected from the group of phosphoric acid, ammonium phosphate and alkali metal phosphates in the amount of 0.05 to 0.25 molar and hydroxylamine in the amount of 0.1 to 0.5 per cent. The pH is given as 4.2–5.8 and the temperature as 60° C.

3 claims.

—AES—

No. 2,792,785, February 22, 1955—Hard Chromium Plating on Light Metals—P. Eyerund, assignor to Metallgesellschaft Aktiengesellschaft, Frankfurt, Ger.

The method consists of plating the aluminum or magnesium and alloys thereof with brass, nickel, iron or copper (after properly precleaning) then immersing the plated metal surface into the chromium plating bath, substantially dissolving the plated metal in the chromium plating bath, then plating directly in said chromium plating bath. Claim 8 states the brass layer should be about 1 millimicron thick.

8 claims.

—AES—

No. 2,703,311, March 1, 1955—Cadmium Fluoborate Electroplating Solution—R. Alexander, assignor to North American Aviation, Inc.

This invention provides for a refined grain cadmium deposit from fluoborate solutions. A bath containing 25–40 oz/gal of cadmium fluoborate is used at a pH of 3.0 to 4.2, containing 0.2 to 5.0 g/l of an enzyme selected from the group consisting of pepsin, diastase of malt and rennet.

6 claims.

—AES—

No. 2,703,295, March 1, 1955—Nonelectrolytic Method for Making Bimetallic Offset Printing Copper Plating Composition—M. Kantrowitz, Washington, D. C., and A. Yelmgren, Borger, Texas.

A copper chemical reduction plating solution is described as consisting of 2 to 5 per cent of ammonium hydroxide, 5 to 10 per cent of neutralized copper sulfate, and 4 to 6 per cent of pyrogallol.

3 claims.

—AES—

No. 2,703,766, March 8, 1955—Process of Continuously Galvanizing—O. Ellis et al., assignors to Armco Steel Corporation, Middletown, Ohio.

The ferrous strip is passed through a zinc bath containing 0.12 to 0.30 per cent of lead and 0.04 to 0.35 per cent of aluminum. The immersion time is less than 6 seconds and the strip speed greater than 80 feet per minute.

7 claims.

—AES—

No. 2,703,781, March 8, 1955—Anodic Treatment of Aluminum Surfaces—F. Hesch, assignor to Kaiser Aluminum and Chemical Corporation, Oakland, Cal.

A process for producing and preserving bright surfaces of high specular reflectivity on aluminum and alloys thereof is claimed in which the aluminum is anodically treated in 15–40 per cent (by weight) phosphoric acid and 2–10 per cent (by weight) sulfuric acid, balance water. Current density is given as about 5–30 asf at 60–90° F and the time half a minute to fifty minutes.

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ROLLED FLAT PLATE ANODE SECTION:

This Photomicrograph shows highly irregular, uncontrolled grain size—a major cause of shedding and resultant rough electrodeposits.

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Company.....

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Patent Abstracts

—AES—

No. 2,704,273, March 15, 1955—Process for Chromium Electrodeposition—Tadashi Yoshida, Tokorozawa City, Japan.

The process consists of plating from a bath consisting of an aqueous solution containing 41 to 73 grams trivalent chromium, 180 to 264 grams of urea, 90 to 123 grams of ammonium, potassium, sodium ions, and sulfate equivalent to ammonium, alkali and chromic ions. The temperature is given as 25°–55° C and an anode of 4–12 per cent tin, 1–10 per cent silver, 0.1–0.5 per cent cobalt, balance lead is recommended. An aging period is mentioned.

6 claims.

—AES—

No. 2,705,191, March 29, 1955—Method and Solution for Treating Aluminum—J. Jumer, Chicago, Ill.

An aqueous solution for polishing aluminum (less than 5 per cent silicon) consists of phosphoric acid (75 per cent) containing 5-300 grams of alkali metal nitrate and 2.5–10 grams of alkali metal sulfate per liter of phosphoric acid. The temperature is given as 180–275° F and the time as 5-50 seconds.

12 claims.

—AES—

No. 2,705,192, March 29, 1955—Etching Solutions—J. Faust and R. Wynne, assignors to Westinghouse Electric Corporation, East Pittsburgh, Pa.

A method is described for the etching of germanium and silicon semiconductors by means of an aqueous solution of hydrofluoric acid, nitric acid and mercuric nitrate.

—AES—

No. 2,705,500, April 5, 1955—Cleaning Aluminum—L. Deer, Indianapolis, Ind.

This invention relates particularly to freeing aluminum surfaces of electrically non-conductive films as, for example, prior to welding. The first claim covers a process in which the oxide is combined with a fluorine containing solution to yield a film of fluoride salts, followed by immersion in a chromic acid-alkali sulfate bath. Later claims cover the conditions more specifically, including a 2 to 5 per cent aqueous hydrofluosilicic acid solution and a chromic acid-alkali sulfate bath at a pH of 1.2–1.5 and a temperature of 185°–195° F. Fluoboric acid and sulfuric-nitric acid combination mentioned usable instead of above.

6 claims.

—AES—

No. 2,705,830, April 12, 1955—Coated Metal Objects—Hiram Lukens, assignor to United States of America.

A method of providing non-porous metal coatings consists of laying down a thin (0.0015 inch) porous silver coat, covering the silver with a water insoluble fused silver salt (order of 0.0005–0.00075 inch) which fills the pores in the silver coat.

Example 1 describes the steps as plating about 0.0005 inch of silver on steel object, placing in an aqueous hydrochloric acid solution (100 cc concentrated acid per liter of solution), making the article anodic at 4 amp/sq ft for 10 minutes, and finally heat treating at 455° C to cause the silver chloride formed on the surface in the previous step to become limpid and seal the pores.

7 claims.

—AES—

No. 2,706,161 April 12, 1955—Flux for Aluminum Coating of Ferrous Materials—Thor Westby, Chicago, Ill.

A flux useful prior to coating steel with aluminum by hot dip methods consists of zinc chloride, 1 pound per gallon, lead chloride, ½ ounce per gallon, and hydrochloric, 15 ml per gallon. The work is passed directly from the flux bath into the molten aluminum.

2 claims.

—AES—

No. 2,706,171, April 12, 1955—Stripping Chromium Plating from Zinc Electrolytically—R. W. and R. Goral, assignors to Enthone, Inc., New Haven, Conn.

Chromium, nickel, copper and mixtures thereof may be stripped from zinc and zinc alloys by making the plated pieces the anode in an aqueous solution consisting of phosphoric acid (10–30 per cent), sulfuric acid (30–55 per cent) and chromic acid (0.1 per cent to saturation). The temperature is given in one claim as 175° F. The stripping solution used at 100 asf in Example I is given as:

	G
CrO_3	5
H_3PO_4	20
H_2SO_4	40
H_2O	35

5 claims.

—AES—

No. 2,706,173, April 12, 1955—Apparatus for Electroplating Crankshaft Journals—H. Wells and F. Gill, Rocky River and Cleveland, Ohio, respectively.

The invention relates to uniformly plating metal of predetermined thickness upon articles of compound geometrical shape, especially the plating of crankshaft bearing surfaces. The apparatus provides for plating in the vertical position and for the anode surface to follow the circular path of the journal surface and maintain its adjacent relationship. See also No. 2,706,174, issued to H. Wells with 6 claims and 9 figures on same subject.

3 claims, 9 figures.

—AES—

No. 2,706,175, April 12, 1955—Apparatus for Electroplating the Inner Surface of a Tubular Article—C. Licharz, assignor to Electro Metal Hardening Co., S. A. Tanger, Paris, France.

The invention describes the use of a hollow circular anode in chromium plating the inner surface of a tubular article wherein the solution is brought in through the hollow anode which is cooled thereby. The whole arrangement is sealed, but an exit is provided to allow the solution and hydrogen to leave.

2 claims, 1 figure.

—AES—

No. 2,706,329, April 19, 1955—Electrically Deposited Core Iron—W. Hespenheide, assignor to Michigan Bumper Corp., Grand Rapids, Mich.

The invention provides for the electrodeposition of iron with special magnetic behavior by depositing said iron with a preferred crystal orientation in the 110 plane. This is accomplished by plating on a chromium surface. The bath described contains 450–700 *g/l* of ferrous chloride, 60–120 *g/l* of sodium chloride and sufficient hydrochloric acid to provide a pH not greater than 4. The temperature is given as 80° C to boiling and the current density as 75–125 asf.

7 claims.

—AES—

No. 2,706,692, April 19, 1955—Method of Bonding Vitreous Enamels—A. E. Chester, assignor to Poor & Company, Chicago, Ill.

The method consists essentially in forming a layer of sulfur or selenium on a ferrous base metal and covering this layer with a thin coating of antimony, arsenic or bismuth, then applying the vitreous enamel and firing.

Example I describes making of the steel article the cathode in a solution made up by adding to 1 gallon of hydrochloric acid (18° Be).

6 ounces of Sb_2O_3
2 ounces of As_2O_3
½ ounce selenium
0.1% lauryl sulfate

at 10 asf and 2.5 volts d.c. with a 3.2 a.c. superimposed voltage.

12 claims.

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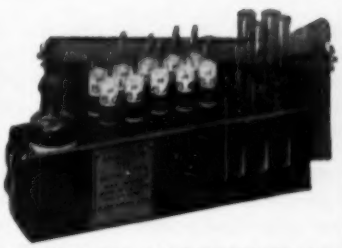

pH of the nickel solution can be controlled at the tank with the Kocour pH Comparator Model BCG (range 3.8–5.4) or model BCP (5.2–6.8). In Bright Nickel solutions, control pH with the economical Kocour Quinhydrone pH Meter Model A.

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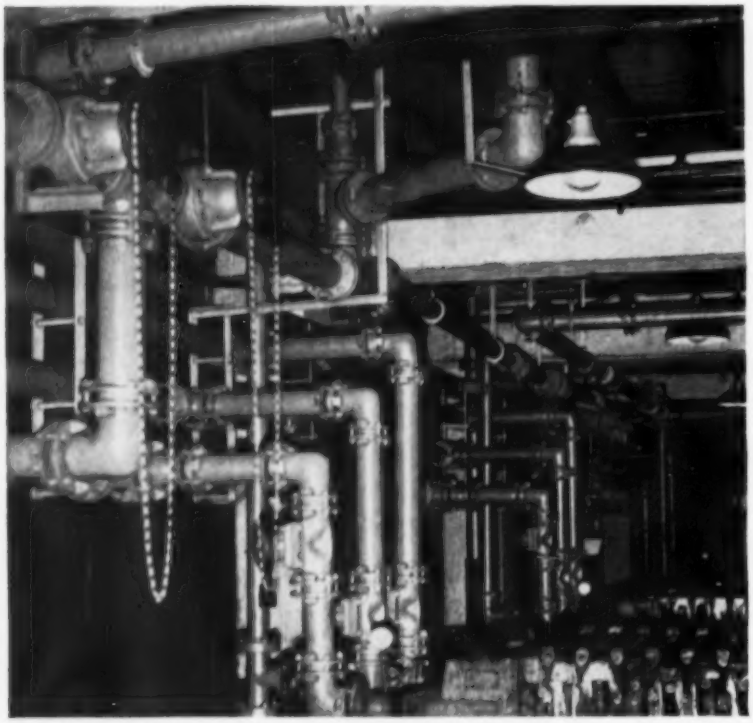
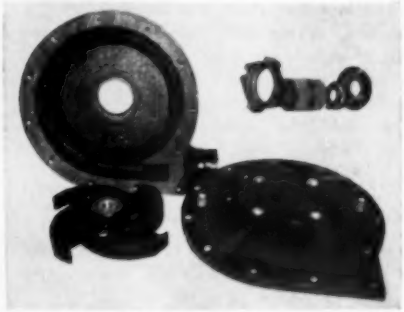


A typical large installation of Haveg pipe, valves and fittings showing simple method of support required. Haveg pipe is unaffected by thermal shock, seldom requires insulation.



These Haveg parts are used in pumps for hot (104°F.) 30% Hydrochloric acid, Typical record: 33 months without replacing a single part. Many users report even longer life.

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Patent Abstracts

—AES—

No. 2,704,916, March 29, 1955—Buff Construction—R. Peterson, assignor to Osborn Mfg. Co., Cleveland, Ohio.

A buff is described having an abrasive material in granular or powdered form adhered to the fabric comprising the buff.

6 claims, 25 figures.

—AES—

No. 2,706,170, April 12, 1955—Electroforming Low Stress Nickel—Vincent Marchese, assignor to the Sperry Corporation, New York, N. Y.

This method claims low stress-nickel electroforms result when plating at 10–50 asf with direct current upon which is superimposed an alternating current at a voltage with a peak substantially three times the direct current voltage. All claims refer to a Watts bath at a pH of about 4.5.

3 claims.

—AES—

No. 2,707,159, April 26, 1955—Wear Resistant Ferrous Metal Articles—J. Foucry *et al.*, assignors to Lubri-Case, Inc., New York, N. Y.

A wear resisting surface is claimed to be formed on ferrous metals when the surface of said metals is subjected to molten alkaline salt bath containing a sulfur salt to incorporate sulfur into the ferrous metal to a depth of more than 0.05 mm.

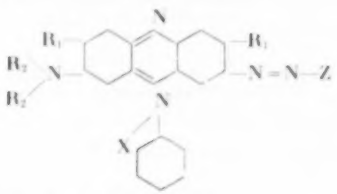
An example of a bath which can be used for this purpose is NaCN (34 per cent), Na_2SO_3 (7 per cent), KCl and NaCl (27 per cent), Na_2CO_3 (16 per cent), K_2CO_3 (16 per cent).

26 claims, 2 graphs.

—AES—

No. 2,707,166, April 26, 1955—Electrodeposition of Copper from an Acid Bath—H. Brown and R. Fellows, assignors to the Udylite Corp., Detroit, Mich.

A fine grained, ductile copper plate is claimed from acid copper electrolytes when small concentrations of organic compounds of the following structure are added:



Wherein R_1 and R_2 = H, CH_3, C_2H_5

X = Cl^-, Br^-, I^-, F^-, SO^-_4, HSO^-_4, NO^-_3

Z = phenyl, naphthyl or said radicals substituted with NH_2, R_2N, OH, OR

Typical compounds disclosed are diethyl safranine azo dimethyl aniline and safranine azo naphthol. The limits are given as 0.0015–0.05 *g/l*, but the narrower claim calls for 0.003–0.02 *g/l*.

14 claims.

See also a related patent, No. 2,707,167 issued to E. Hoover, same assignee as above, wherein ductile, fine-grained copper electrodeposits can be obtained by using an addition agent similar in structure to the above organic compound except $N\langle^{R_3}_{R_3}$ is substituted for —N=N—Z and R_1, R_2 and R_3 are H, CH_3, C_2H_5 or C_4H_9.

10 claims.

—AES—

No. 2,707,170, April 26, 1955—Electrodeposition of Titanium—E. Wainer, assignor to Horizons Titanium Corporation, Princeton, N. J.

Titanium may be deposited from a fused electrolyte consisting of alkali metal halide (Cl^-, Br^-, I^-), 2 to 30 per cent an alkali metal fluotitanate and titanium monoxide. The monoxide is introduced in an amount greater than will dissolve and acts as a reservoir to replace titanium plated out.

10 claims.

See also Nos. 2,707,168 and 2,707,169 issued to same company.

—AES—

No. 2,707,323, May 3, 1955—Method of Producing Copper Clad Steel Plates—T. Watson, assignor to Lukens Steel Co., Coatesville, N. J.

The method consists of nickel placed next to a steel slab, with the nickel face adjacent to the steel, heating the assembly to 1550°–1800° F followed by rolling to join and reduce.

6 claims.

—AES—

No. 2,707,356, May 3, 1955—A Machine for Automatically Testing and Adjusting the Values of Printed Circuit Resistors or Capacitators—S. Bayha, assignor to Emerson Radio and Phonograph Corp., New York, N. Y.

A machine is described for testing printed circuit components which is provided with abrading means to remove part of component as needed.

13 claims.

—AES—

No. 2,708,171, May 10, 1955—Method of Controlling Thickness in Continuous Galvanizing—C. Ingelfield, assignor to U. S. Steel Corporation.

The method consists of heating the strip as it leaves grooved exit rolls at surface of zinc bath by means of gas flames directed at the edges of the strip. This makes for uniform thickness of zinc coating over the width of the strip as opposed to normal edge build-up of zinc.

3 claims, 5 figures.

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Article References

Most of the articles listed here may be obtained by writing to the publication. Addresses are included for the reader's convenience.

98. ALUMINUM

a. *FINE-SCALE STRUCTURES PRODUCED ON ALUMINUM BY ELECTROPOLISHING OR ETCHING*
N. C. Welsh
Research (Supplement), v. 8, June 1955, p. 28–29

99. CHROMIUM

a. *CHROMIUM WITHOUT MICROPOROSITY PLATED DIRECTLY ONTO BASE METAL*
Precision Metal Molding, v. 13, June 1955, p. 67–68

b. *THE EFFECT OF CHROMIUM PLATING ON THE FATIGUE STRENGTH OF STEEL*
C. Williams and R. A. F. Hammond
Metal Industry, v. 86, May 27, 1955, p. 435; disc., p. 435–438

100. CLEANING, DEGREASING AND PICKLING

a. *ALKALINE SOLUTIONS: WHAT TO USE FOR EFFECTIVE CLEANING*
J. B. Mohler
The Iron Age, Vol. 176, No. 4, July 28, 1955, p. 59–62

101. COPPER-LEAD

a. *PERIODIC CURRENT REVERSAL IN PLATING COPPER-LEAD ALLOYS*
Nelson W. Hovey, John L. Griffin and Albertine Krohn
Journal of the Electrochemical Society, Vol. 102, No. 8, August 1955, p. 470–473

102. CORROSION

a. *HOW ZINC COATINGS SLOW ATMOSPHERIC CORROSION*
O. B. Ellis
Iron Age, p. 79–81, August 18, 1955, Vol. 176, No. 7

b. *THE USE OF VOLATILE CORROSION INHIBITORS AS A PRESERVATIVE MEDIUM FOR LONG TERM STORAGE OF ORDNANCE MATERIAL—ADDENDUM IV—RESULTS AFTER FIVE YEARS OF EXPOSURE*
January 1955. $1.00. A Rock Island Arsenal Research Report

c. *DESIGN AGAINST ATMOSPHERIC CORROSION*
Henry T. Rudolf
Corrosion, Vol. 11, No. 8, August 1955, p. 35–38

d. *STRESS CORROSION CRACKING OF HARDENABLE STAINLESS STEELS*
F. K. Bloom
Corrosion, Vol. 11, No. 8, August 1955, p. 39–49

e. *THE ELECTROCHEMISTRY OF INHIBITOR ACTION (AN EDUCATIONAL LECTURE)*
R. B. Mears
Corrosion, Vol. 11, No. 8, August 1955, p. 50–52

103. DIE CASTINGS

a. *PLATING DIE CASTINGS IN CONVEYORIZED PLANT*
Ezra Blount
Product Finishing, Vol. 19, No. 11, August 1955, p. 24–36

104. ELECTROLESS NICKEL

a. *ELECTROLESS NICKEL DEPOSITION—ACTIVATION OF NON-METALLIC SURFACES*
Fred Pearlstein
Metal Finishing, Vol. 53, No. 8, August 1955, p. 59–61

105. ELECTROPLATING—GENERAL

a. *REPORT OF ANNUAL CONFERENCE OF THE INSTITUTE OF METAL FINISHING*
Reported by Robert Pinner
Metal Finishing, Vol. 53, No. 8, August 1955, p. 49–52

106. ELECTROPOLISHING

a. *THE INFLUENCE OF A SURFACE ACTIVE AGENT IN THE ELECTROPOLISHING OF COPPER*
K. F. Lorking
Journal of the Electrochemical Society, Vol. 102, No. 8, August 1955, p. 479–484

107. GRINDING AND FINISHING

a. *STAINLESS STEEL FINISHING*
Industry & Welding, v. 28, June 1955, p. 78–82, 152

b. *SURFACE FINISHING ALUMINUM CASTINGS*
John H. Keating
Finish, v. 12, July 1955, p. 33–36

108. MAGNESIUM

a. *ELECTROLYTICALLY FORMED COATING FOR MAGNESIUM ALLOYS*
National Bureau of Standards, Technical News Bulletin, v. 39, June 1955, p. 77–79

b. *THE EFFECT OF AN ANODIC (HAE) COATING ON THE FATIGUE STRENGTH OF MAGNESIUM ALLOY SPECIMENS*
J. A. Bennett
American Society for Testing Materials, Preprint No. 77, 1955, 5 p.

109. MISCELLANEOUS

a. *NOTE ON "INVERTED RELIEF" IN PHOTOGRAPHIC ILLUSTRATIONS*
Neil S. Dempster
Corrosion, v. 11, July 1955, p. 312–314

110. MOLYBDENUM

a. *ELECTRODEPOSITION OF MOLYBDENUM ALLOYS FROM AQUEOUS SOLUTIONS*
D. W. Ernst, R. F. Amlie and M. L. Holt
Journal of the Electrochemical Society, Vol. 102, No. 8, August 1955, p. 461–469

111. NICKEL

a. *ELECTRODEPOSITION OF NICKEL FROM FLUOBORATE SOLUTIONS. PART II*
C. B. F. Young and William Strobach
Metal Finishing, Vol. 53, No. 8, August 1955, p. 53–58

112. THEORETICAL

a. *STUDIES ON ALTERNATING CURRENT ELECTROLYSIS. III. EFFECTS OF CONCENTRATION ON POLARIZATION CAPACITY AND POLARIZATION RESISTANCE*
A. Edward Remick and Herbert W. McCormick
Journal of the Electrochemical Society, Vol. 102, No. 9, September 1955, p. 534–544

113. TESTING

a. *TESTING THE THICKNESS AND ADHESION OF ELECTROPLATED COATINGS*
Mechanical World and Engineering Record, v. 135, June 1955, p. 256–261

114. TITANIUM

a. *TITANIUM TODAY—A SPECIAL STAFF REPORT*
American Machinist, p. 90–104, August 15, 1955, Vol. 99, No. 17

Below are listed the addresses of publishers where the reader may send for article references.

American Machinist
330 W. 42nd Street
New York, N. Y.

Corrosion
M & M Building
Houston 2, Texas

Finish
Elmhurst Nat'l Bank Bldg.
York St. at Park Avenue
Elmhurst, Ill.

Industry & Welding
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Cleveland 13, Ohio

Iron Age
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Philadelphia, Pa.

Journal of the Electrochemical Society
216 W. 102nd Street
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Books

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Technical Speller by Gessner G. Hawley. 160 pp. Reinhold Publishing Corp. $2.50 to nonmembers; $2.15 to members.

This little book contains a wide selection of technical words used in the fields of chemistry, physics, electronics, engineering, biology and medicine. Also included are common words of troublesome spelling which occur repeatedly in technical writing and correspondence. Excellent reference book for writers of technical letters and reports, advertising copy, scientific articles and books and secretaries who take technical dictation or transcribe manuscripts.

Principles of Industrial Waste Treatment by Fred Gurnham. 399 pp. John Wiley & Sons, Inc. $9.50 to nonmembers; $8.10 to members.

Approaching the subject from an operational or unit operations point of view, this new book deals with the sources, pollutional effects, and methods for the treatment and disposal of liquid wastes produced by industry.

Dr. Gurnham first deals with the effects of wastes on streams and sewerage systems. Following this, he examines the criteria developed by the sanitary engineer for evaluating pollution; physical, chemical, organic, and biological properties are considered separately.

The greater part of the book covers the operations and processes used to treat industrial wastes before their discharge into natural waters or municipal sewers. In the three chapters devoted to physical treatment, Dr. Gurnham analyzes sedimentation, filtration, and heat transfer operations. The four chapters on chemical treatment consider pH adjustment, oxidation and reduction, coagulation and chemical reaction, and absorption and ion exchange. In the discussion of biological treatment, Gurnham includes biological filtration, activated sludge, and lagoons. Anaerobic biological treatment and miscellaneous methods are also covered. Disposal programs and brief descriptions of industries with major disposal problems conclude the volume.

Branch of the Tartan by Virginia Huck. 250 pp. Appleton-Century-Crofts, Inc. $3.50 to nonmembers;

This book traces the history of 53-year-old Minnesota Mining and Mfg. Co., developers of abrasive discs, abrasive cloths and industrial adhesives used throughout the metal industry.

Behind the development of these products are the same qualities—imaginative research, venturesome capital, and progressive management—that have made the company a classic example of free enterprise in action, the book says. It calls these characteristics the key to its evolution from a small mining concern to a large, diversified manufacturing enterprise.

In a chapter called "Debt-Free at Last" the book describes the development of an abrasive cloth called "Three-M-Ite" during World War I.

This product was widely used throughout the metal industry, says the book, because it proved to be far superior to the natural mineral, emery, for cutting metal. Later, the abrasive material was made even more flexible, so that workmen could bend the sheets to allow sanding around moldings and other curved metal surfaces.

The second world war provided the impetus necessary for the success of special machinery to increase the efficiency and cutting power of coating abrasives, according to the book.

Protective Coatings for Metals by R. M. Burns and W. W. Bradley. (ACS Monograph No. 129) 64 pp, $12.00 to nonmembers; $11.20 to members. Reinhold Publishing Corp.

In this Second Edition are included expanded sections on the evaluation of organic coatings; new chapters on corrosion inhibitors, chemical conversion coatings, and sprayed metal coatings; explanations of troublesome phenomena such as "silver migration"; and "metallic whiskers"; latest practices in metal cleaning, coating application and testing. This is an important book for corrosion engineers, metallurgists, chemists and everyone concerned with the technology of corrosion control.

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It has been my intention to write you since talking to Dr. Gardner Foulke in Grand Rapids, Mich. in January 1953, when he expressed amazement upon hearing that women read PLATING. He suggested I write, giving you my viewpoint on the different subjects and activities.

After attending several branch parties, my husband (who belongs to the Detroit branch) and I have reached the conclusion that they keep getting better every year. We have met some wonderful people in Lansing, Grand Rapids, Jackson, Dayton, Indianapolis, Cleveland and New York.

I really don't think there is another organization of people who actually knock themselves out to give members a good time like the AES. It's a pleasure to meet friends from year to year and party to party.

I have had people ask me if I actually do read PLATING and can assure them I do and get a lot of good out of it; after all, living with a man who has been connected with the business for 30 years, why not? At times we have been able to discuss different things and he tells me it helps a lot to be out of the shop and be able to talk over some of the problems that arise during the day.

There have been instances where my husband has been working on a problem and I have gone through PLATING magazine and found something in connection with it that has given him an idea; he assures me it is a short cut having two people working on something if they understand each other.

I know some of the problems and conditions that arrive, having helped out in a job-shop my husband and his partner had during the war, and am sure that those women who have some knowledge of what their husbands have to contend with and can give them some little help have a much more contented man at home.

Getting back to the yearly get-togethers and the expositions, I do think it is the time when old friends and acquaintances look forward to meeting and talking over old times; quite often you make new friends and then lose track of them, pick up the PLATING magazine and read something about one of them which brings back old and pleasant memories; now you know why I enjoy reading it.

Attended the recent national convention in Cleveland and do think many thanks are due all the committees. Mrs. Hoffman and her committee are to be especially commended for the wonderful program they had for the women. You know, we hate to miss any of the luncheons, trips, shows, etc., plus the exposition which enables even a woman to see the advancements made.

The Alpine village trip and the talk at the Lake Shore Hotel by our own Dr. Saltonstal were some of the highlights. Would have enjoyed hearing more on jewelry finishing but time was limited . . . maybe next year.

I know the new committees are looking for suggestions and ideas and if it's excusable coming from a woman I'd like to pass it on . . . that the last day be left free to enable us poor females time to put on a new hairdo and try to look lovely for that night . . . what say ladies? ? ? ?

Think maybe I have done enough rambling for this time and I can assure you I shall not be so long in again expressing my viewpoint and thanks to those who make it possible for the wonderful times we have had.

Hope to see you all in Washington in 1956.

Sincerely,
Edna Heavens
(Mrs. Charles A. Heavens)
393 S. Marshall
Pontiac 20, Michigan

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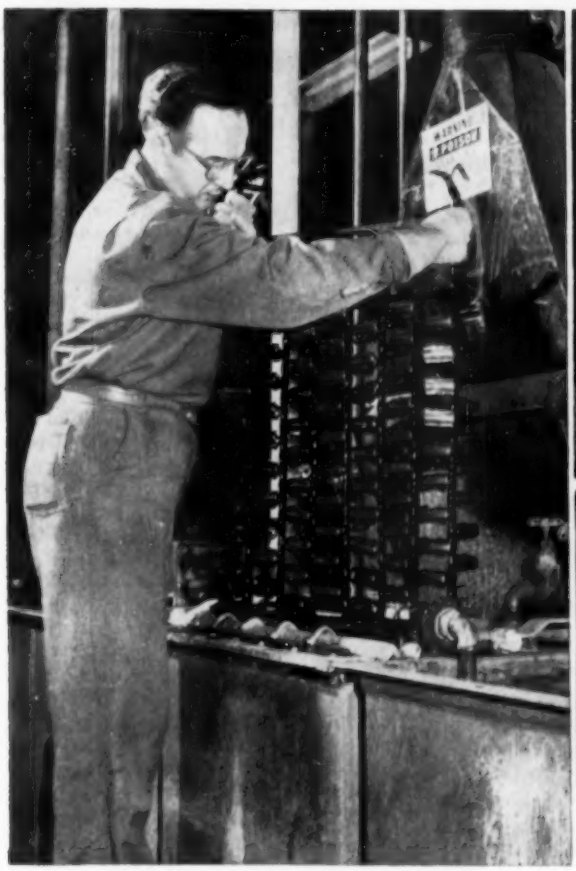

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Intersociety News

Highest Honors to Youngest Members

Investment Casting Institute Wins ATAE Award

A veritable stripling grabbed one of the annual "oscars" awarded by the American Trade Association Executives for distinguished service.

The stripling is the Investment Casting Institute, a trade association which in a little over a year has succeeded in winning the highest possible honor in trade association work. In the 26 year history of this national award no other trade association has accomplished this objective in so short a time.

Results of the annual competition were announced at the annual ATAE meeting at Mackinac Island, Michigan, during the first week in August. Criteria for judging are distinguished service to industry, to industrial development, and to the public as a whole, or some important segment of the public.

The Hon. Sinclair Weeks, U. S. Secretary of Commerce, was chairman of the awards jury which selected the winners. Other members of the jury were Clem D. Johnston, president of the U. S. Chamber of Commerce; Henry G. Ritter III, president of the National Association of Manufacturers; Dean Richard L. Kozelka, School of Business Administration, University of Minnesota; and Dean Russell A. Stevenson, School of Business Administration, University of Michigan.

Dean Stevenson made the presentation to Harry P. Dolan, Executive Secretary of the Investment Casting Institute as the winner of the national and regional association group with an annual budget of less than $50,000.

In making the presentation, Dean Stevenson read the following citation: "The American Trade Association Executives present this Grand Award to the Investment Casting Institute for having rendered outstanding service to the industry it represents as well as to the American public."

Smaardyk on Lubrication in Atomic Power Plants

Oils and greases will not play an important part as lubricants for moving parts in the water-cooled nuclear section of atomic power plants, according to a paper presented at the recent Diamond Jubilee Semiannual meeting of the American Society of Mechanical Engineers in Boston.

The speaker, A. Smaardyk, associate engineer, Argonne National Laboratory, Lemont, Ill., told his audience that organic lubricants react chemically under irradiation and that quantities of lubricant depositing on the fuel elements would impede heat transfer. Such conditions have made it imperative that research find bearing materials that would be compatible using the cooling water as the lubricant. This is required despite the fact that water is not a good lubricant, and introduces a corrosion problem, along with the fact that the temperature of the cooling water ranges from 200 to 500 degrees F.

Smaardyk described the many tests made on sliding, roller and ball type bearings. On sliding type bearings graphite materials were found to be the only ones suitable for high speeds and loads up to 100 pounds per square inch, provided the journal material was compatible with carbon. Titanium carbide proved superior to other materials when used with carbon.

Initial tests on roller bearings included needle, tapered roller and special barrel-type rollers. Results were such that tests on these types were discontinued in favor of further work on ball bearings.

According to Smaardyk, the most troublesome feature on ball bearings were the metallic retainers; they were a constant source of galling and scoring. Thus, tests were conducted without retainers but with spacer balls placed alternately between the load balls, and with micarta, nylon and rubber retainers.

Numerous tables and illustrations presented with the paper compared the results obtained with different bearing metals as well as different types of bearings. But, as would be expected, the load-carrying capacity of any of the bearings tested using water as a lubricant is only a few per cent of that of a similar oil-lubricated bearing.

Copies of Smaardyk's paper, No. 55-SA-42, may be obtained at 50 cents each from Order Dept., ASME, 29 W. 39th St., New York 18, N. Y.

NAMF Urges Hearing and Congressional Investigation of Nickel Situation

Nickel—or the lack of it—is continuing to cause a stir in the metal finishing industry. Just recently, the following plea was released to job shop owners and operators by John Palik, Jr., president of the National Association of Metal Finishers:

Palik

"Suppliers are announcing further cuts in nickel allotments, in the face of information being released by the government to the effect that more and more nickel is being made available from government stockpile assignment. Platers are now receiving only 25 per cent of their base allotments and further reductions will mean disaster to the industry.

"You are urged to send a telegram immediately to your Senators and Representatives in Congress demanding an open hearing of the situation at once, and a full investigation of the entire nickel situation. Immediate action is necessary for relief.

". . . You cannot continue to get by with only one-fourth of the already meager allotment assigned to you, or to pay up to three times normal price for what little added nickel you can obtain. Your immediate action may save your business.

". . . Only by forcing a full investigation of the situation can our industry survive. Don't let time pass before you act. A volume of demands from platers all over the country is needed simultaneously, and immediately. Send that telegram now!"

ASTE Show Space Assignments

Space assignments in what promises to be the biggest industrial exposition ever sponsored by the American Society of Tool Engineers are now under way according to Harry Conrad, executive secretary of the ASTE. Specific assignments have been issued to 360 exhibitors whose requests for space were received prior to July 20th. At the rate space requests are coming in, an early sellout is indicated, Conrad said.

"This represents the biggest demand for space so long before the show in the history of the Society," Conrad said. "Making specific space assignments this early is also unprecedented and is due to pressure from exhibitors for definite assignments to enable them to plan their exhibits."

In addition, visitors to the show have already begun to flood the Chicago convention bureau with requests for hotel rooms covering the show period, March 19–23.

For the first time special meeting rooms for exhibitors' staffs will be available at the 1956 ASTE Industrial Exposition in Chicago's Amphitheatre.

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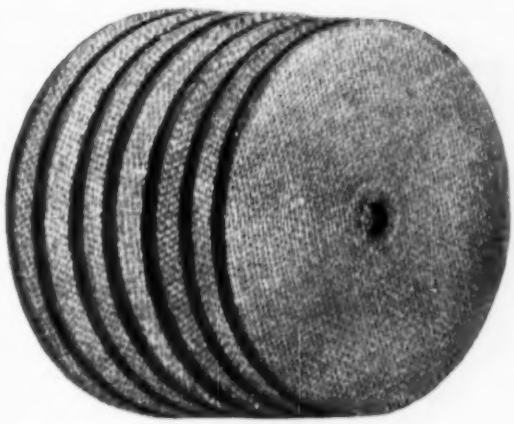

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Intersociety News

Announcement of the new service is made by Harry E. Conrad, executive secretary of the American Society of Tool Engineers.

"So many of our exhibitors are planning to have large sales staffs to man their booths that the problem of finding a room for sales meetings, pep meetings and other conferences is more urgent than ever.

ASTE to Discuss Diamonds

A symposium on industrial diamonds will be one of the highlights of the American Society of Tool Engineers national convention and industrial exposition at Chicago's International Amphitheatre, March 19–23, 1956.

The symposium will be co-sponsored by the ASTE and Armour Research Foundation of Illinois Institute of Technology, and will be held March 19–21.

Technical co-chairmen are Harold C. Miller, assistant manager of Armour Research Foundation's physics research department, and Col. Leslie Fletcher, ASTE research director.

A kick-off dinner in Illinois Tech's Commons building lounge will open the symposium on March 19. All other sessions will be held at the amphitheatre.

Miller said 15 technical papers on the making, use, and standards of diamond tools are to be presented by experts from the United States, Europe, and South Africa.

Stevens Now Offers PhD in Physics

Requirements for the doctoral degree were agreed to by the Stevens faculty last spring. Formerly, the Stevens Department of Physics was able to offer only the Master of Science degree.

The doctoral program in physics is one of three newly approved by the faculty, the others being in mathematics and chemistry. These three supplement the program leading to the Doctor of Science degree in applied mechanics which the Department of Mechanical Engineering has offered for a number of years.

First classes in the graduate program at Stevens met on Thursday, September 22. All formal classroom work at the graduate level is given at night or on Saturday mornings for the benefit of students employed in the metropolitan New York-New Jersey area.

This year is the twenty-fifth anniversary of the establishment of formal programs in graduate work. Stevens has offered advanced courses of study almost since its founding in 1870, but did not start evening graduate work until 1930. Just under 800 students were enrolled in the graduate work last year given by eight departments in fourteen major fields.

Sales Clinic for Effective Selling

The Fifth Annual Sales Clinic sponsored by the Salesmen's Association of the American Chemical Industry will be held at the Roosevelt Hotel, New York, October 24, in conjunction with the Annual Dinner of the Association. General Theme of the Clinic will be "Effective Selling of Chemicals."

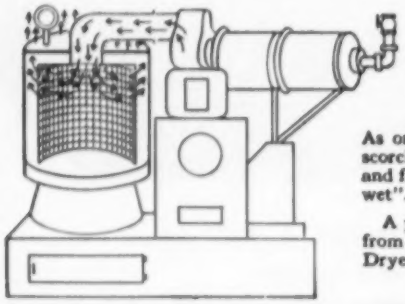
The morning session will be devoted to talks by four speakers on the chemical industry and sales technics, and the afternoon session will be devoted to four panel sessions, running concurrently, covering subjects that were discussed in the morning. The morning speakers will be present at the panel sessions, a good portion of which will be devoted to question and answer periods.

The dinner speaker will be Dr. Henry B. Hass, president of the Sugar Research Foundation, whose topic will be "What Will You Be Selling Tomorrow?" At the luncheon, the topic will be "The Impact of the Chemical Industry on Today's Business."

Morning speakers, and their subjects will be Jack Klein, president of the Klein Institute for Aptitude Testing, Inc., "Were You Born to be an Effective Chemical Salesman;" Robert A. Gopel, manager of sales personnel development, The Koppers Company, "How an Ordinary Fellow Becomes a Salesman;" W. Edward Keegan, sales manager, Shell Chemical Corporation, "The District Office—How to Run It;" and J. Warren Kinsman, vice-president of E. I. du Pont de Nemours & Co., "You, the Salesman, and Your Management."

The Panel sessions will cover: "The Individual Salesman," "Training for Chemical Salesmen," "Administration of the District Office," and "Is Selling for Distributors Different."

EVER BLOW INTO AN ASH TRAY?



If you did, you saw a practical demonstration of the principle of air deflection. In old type dryers, air *blown* in from the top is deflected by the top layer of parts. As one user put it, "the top layer gets scorched, the next layer is nice and dry, and from there on down the parts are still wet".

A powerful suction fan *draws* the air from the bottom of the modern Nobles Dryer. Fresh air rushes in from the top to fill the vacuum and is drawn through the entire contents from top to bottom where it is expelled with the water.

Steam or electric heaters may be mounted compactly in the cover in contrast with space consuming, heat wasting, separate units connected by pipe.

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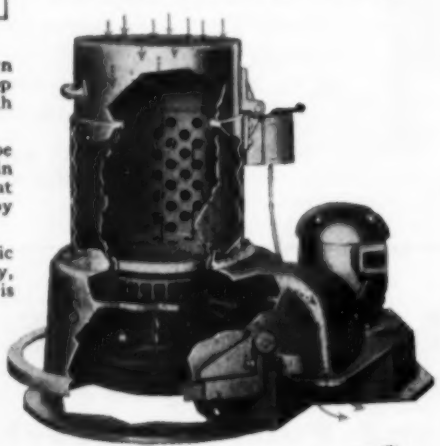

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Intersociety News

F. Paul Ronca Elected Chairman of The Technical Committee of the Abrasive Grain Association

F. Paul Ronca, manager of the Silicon Carbide Product Engineering Department of The Carborundum Company was elected chairman of the Technical Committee of the Abrasive Grain Association.

The function of the Technical Committee is to set up and standardize grain size and related technical specifications having to do with the manufacture of abrasive grain. This Committee works with the United States Bureau of Standards as the representative of the eleven manufacturers and processors that make up the Abrasive Grain Association.

A graduate of Worcester Polytechnic Institute, Mr. Ronca has been associated with the production of abrasive grain at The Carborundum Company for thirty-one years. He is a member of the American Chemical Society, the National Association of Foremen, and the American Society of Quality Control.

A native of Barre, Vermont, Mr. Ronca now lives in Niagara Falls, New York, where he makes a home for his wife and two children.

November Meetings of the Institute of Metal Finishing

S. Wernick, Honorary Secretary of the Institute of Metal Finishing, announced the following meetings for November:

Nov. 1—Midland Branch will hold a meeting at James Watt Memorial Institute, Great Charles St., Birmingham 3. A Debate will be given.

Nov. 3—North-West Branch will hold a meeting at the Engineer's Club, Albert Square, Manchester. Prof. J. W. Cuthbertson, D.Sc., F.I.M., A.M.I.E.E., will present a paper on "Trends of Progress in Electrodeposition."

Nov. 14—Institute Annual General Meeting and Induction of President, at London-Charing Cross Hotel. Presidential Address by R. A. F. Hammond, B.Sc., A.R.C.S., F.R.I.C.

Nov. 16—Joint Meeting of Organic Finishing Group with S.A.S.M.U.T.A., at Mason Theatre, Birmingham University, Edmund St., Birmingham. J. J. Stordy, B.Sc., and W. G. J. Appleton, A.M.I. Mech. E., M. Inrr. F., will present a paper on "Modern Painting and Stoving Techniques, Including Flow Coatings."

Nov. 21—London Branch will hold a meeting at Imperial College, South Kensington. Papers from Advanced Metal Finishing Students.

Nov. 25—Sheffield Branch will hold a meeting at Grand Hotel (Fitzwilliam Room), Sheffield. Open Evening Discussion. C. Wharrad in the chair.

Classified Advertisements

Only "Help Wanted" and "Situations Wanted" will be accepted. Rates: $.20 per word, minimum $5.00. AES branch members and members-at-large, in good standing, are entitled to a total of three *free* advertisements in one year. Last day for inserting advertisements is the 10th of month preceding date of publication. When answering advertisements please address as follows: Box number, PLATING, 445 Broad Street, Newark 2, N. J.

WANTED—Foreman, hard chrome. Philadelphia area, permanent job and good opportunity. Give details in first letter: schooling, work history, salary desired. Reply to Box S6, PLATING.

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WASHINGTON COMMITTEE FOOT NOTES

Wm. Blum Jules Horelick Arthur Pierdon Kenneth Huston

KENNETH M. HUSTON

Co-chairman

He is a Senior Research Engineer in the Baltimore Research Laboratories at the Armco Steel Corporation. He is responsible for corrosion, surface finish and electroplating investigations related to customer's problems.

Previous to joining Armco in 1945, he was a planning engineer for the Point Breeze Works of the Western Electric Company and was responsible for the development of a continuous process for lead-brass plating telephone conductor on which process he holds several patents.

He served as President of the Society in 1948, and President of the Baltimore Washington branch 1944–1945. He is a charter member of the Past Presidents Association (organized as the Order of the Pot). His presentation of the first pot to Walter Pinner resulted in establishing the Order. He is Vice Chairman of ASTM Committee B-8 on Electrodeposited Metallic Coatings, a member of the National Association of Corrosion Engineers, The Electrochemical Society and Alpha Chi Sigma Fraternity, being a past president of the Baltimore Professional Chapter. He graduated from Rose Polytechnic Institute with a BS degree in Chemical Engineering.

The Committee is fortunate to have the advantage of his superior organizing ability. He has made it a point to see that each sub-committee chairman knows every detail of his assignment so that nothing will be missed.

WILLIAM BLUM

Honorary Co-Chairman

Born in Philadelphia on December 28, 1881.

Degree of BS (1903), PhD. (1908), and Honorary ScD. (1953), University of Pennsylvania.

Chemistry Professor, University of Utah—1903 to 1909.

Chemist, National Bureau of Standards, 1909 to 1951. Chief of Electrodeposition Section and Assistant Chief of the Chemistry Division. Researches on Analytical Chemistry and Electrodeposition.

Honorary member of the AES, Electrochemical Society and Institute of Metal Finishing.

Awarded medals by the American Institute of Chemists, Electrochemical Society U. S. Department of Commerce, Institute of Metal Finishing and Franklin Institute.

Author of over 100 papers on electrodeposition and co-author of Blum and Hogaboom "Principles of Electroplating and Electroforming".

Since his retirement in 1951, he serves as a consultant, especially to the Department of Defense. He is active in the AES Research Committee and is a member of two Project Committees.

Although his title is "Honorary", Dr. Blum is taking a very active part in the work of the Executive Committee and the committee as a whole.

ARTHUR G. PIERDON

General Chairman

Employed by the Art Metal Finishing Company of Washington, D. C. since 1923. President of the Company since 1945.

He is a Charter Member of the Baltimore Washington Branch of the AES and has served two terms as Branch President. He served three years as Treasurer of the National Association of Metal Finishers and is now a Director of that organization. He is also a member of the Electrochemical Society, Washington Board of Trade, and Greater Washington Industrial Council.

His job as General Chairman is a big one. With the able assistance of his Executive Committee, he has everything well in hand and is well on the way to achieving his modest ambition of making the 1956 Convention the best ever.

JULES HORELICK

Finance Committee

Born in Chicago, Illinois. BS in Engineering University of Illinois 1937.

After three years as foreman at Standard Gas Equipment Corporation, and four years as Production Manager of Baltimore Enamel & Novelty Company, he is now Vice President of Allied Metal Finishing Corporation, all in Baltimore, Maryland. His hobbies are golf, fishing and woodworking.

His Committee has prepared the budget and set up a bookkeeping system for the Convention which will provide full details of the entire operation and which we hope will be of assistance to subsequent Convention Committees. In addition he serves on the Executive Committee.

VINCEN J. HUGHES, JR.

Plant Visitation Committee

Hughes

Attended University of Maryland, 1938-1942. Commissioned 2nd Lt. in R.O.T.C. in 1942 and went on 3½ years active service in the Army.

Since his discharge, he has worked with the Hughes Chemical Supply Company and is the representative for Pennsalt materials in this area.

His Committee has planned five plant trips for the 43rd Convention and already has firm commitments for most of them.

Brenner

Pierdon

Barrows

Metzger

Thiede

ABNER BRENNER

Education Committee

He received a BA degree in 1929 from the University of Missouri, MS degree from the University of Wisconsin 1930, and PhD degree from the University of Maryland in 1939. He has been on the staff of the National Bureau of Standards since 1930 and is Chief of the Electro-deposition Section. Some of the subjects on which he has done research are alloy deposition, physical properties of electrodeposits, electroless plating, electrodeposition of metals from non-aqueous media, cathode diffusion layers, and thickness gages for electrodeposits.

The Educational Program for 1956 is about 90 per cent complete. Between 15 and 20 papers have been promised.

CARL H. THIEDE

Program Committee

His experience in electrodeposition is specialized. Until 1926, he was with the Wright Electrotype Company of Indianapolis. Since then he has been with the Potomac Electrotype Co. of Washington, D. C., and was appointed superintendent of the plant in 1942.

He is a member of the Washington Club of Printing House Craftsmen. He has been Secretary of the Baltimore-Washington Branch of the AES for two terms.

His committee has charge of the printed program for the 43rd Convention and also of all other printing required by the Committee.

WENDELL P. BARROWS

Entertainment Committee

Born at North Acton, Massachusetts in 1897. Studied at Tufts College and George Washington University.

He is a Chemical Engineer at the U. S. Naval Gun Factory in Washington, D. C., his specialty—Protective Coatings.

He is a Charter Member of the Baltimore Washington Branch of the AES. Also a member of the Electrochemical Society of the ASTM Committee B-8.

His Committee is profiting by the experience of previous Conventions in planning the entertainment of the 43rd Convention. In this they have the able assistance of Mrs. Barrows who has considerable experience in this job.

MRS. MARY A. PIERDON

Ladies' Committee

Ex-school teacher, Graduate of Wilson Normal School in Washington, D. C.

Chief interest—4 daughters and 2 sons.

Past President of Murch Elementary School Home and School Association.

Secretary of Wilson Senior High School Home and School Association at present. Also active in affairs of All Saints Episcopal Church.

WILLIAM METZGER, JR

Outing Committee

Born in Richmond, Virginia in 1922. Studied at the University of Richmond and obtained his B S degree in 1943.

He has worked in the Electrodeposition Section of the National Bureau of Standards since 1943 except for service in the U. S. Navy from 1944 to 1946.

His Committee is planning an outing that it is rumored will be one of the best to date.

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WASHINGTON

FIELDING OGBURN

Registration Committee

Born in Philadelphia, Pennsylvania in 1919. Studied at University of Chicago and completed requirements for BS degree in 1941.

Employed by Dow Chemical Company 1942–1943. Served in U. S. Army with combat duty in Italy. Since 1946 he has worked in the Electrodeposition Section of the National Bureau of Standards and since 1952 he has been an Assistant Chief of the Section.

He has served as President and in several other offices of the Baltimore Washington Branch of the AES. Chairman of Washington-Baltimore Section of The Electrochemical Society. Chairman of Sub-Committee 1 of ASTM Committee B-8 and is Director of AES Research Project No. 13.

His Committee has nearly completed arrangements for Registration at the Convention.

Ogburn

Boggess

TALMADGE R. BOGGESS

Transportation Committee

Born in Alleghany County, Virginia in 1904. Spent most of his early years on a farm in Virginia except for six years in Okanogan County, Washington.

Employed by Norfolk & Western Railway Company in 1922 as a track maintenance man and later transferred to the Roanoke Shops. Here, one of his assignments was reconditioning the small plating and finishing shop which had been shut down for six months due to a strike. He became interested in plating and in 1923 started his apprenticeship in the plating department. Since 1933 he has been foreman of the shop.

He has completed two University of Virginia Extension Courses in Mechanical Engineering and Dr. C.B.F. Young's Course in Electroplating. He also had private tutoring in electroplating by the late Oliver J. Sizelove as well as tutoring in electrochemistry.

He has been a member of the AES since 1934. He is married and has a daughter and a granddaughter.

His Committee will see that all the members get the word on the many railroads, bus lines, and airlines serving Washington, D. C.

ASAF A. BENDERLY

Hotel Committee

Born March 24, 1922.

He studied at the College of the City of New York, B. Ch. E. 1944, and at Polytechnic Institute of Brooklyn, M. Ch. E. 1953.

He was employed as an electroplating chemist with the Houdaille-Hershey Corp. and as AES Research Associate on Project 13 at the National Bureau of Standards in Washington, D. C. He is currently chief of the Materials Development Section of the Diamond Ordnance Fuze Laboratories, Washington, D. C.

He is past President of the Baltimore-Washington Branch of the AES.

His Committee will look after the hotel reservations and has already received and acknowledged requests for some of the meeting rooms.

Benderly

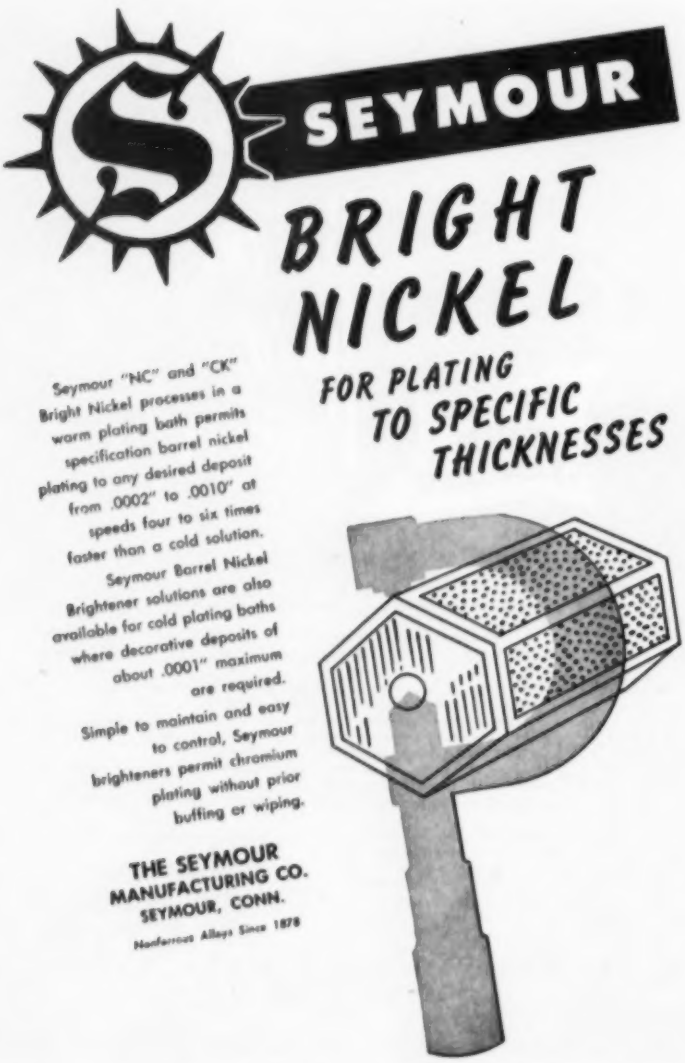
Lamb

VERNON A. LAMB

Banquet Committee

Born in Spencer, Iowa in 1910. Attended Iowa State College, University of California, State University of Iowa. PhD. degree in Physical Chemistry in 1937.

Taught Chemistry at State University of Iowa, State Teachers College, Plattesville, Wisconsin; University of Mary-


SEYMOUR
BRIGHT NICKEL
FOR PLATING TO SPECIFIC THICKNESSES
Seymour "NC" and "CK" Bright Nickel processes in a warm plating bath permits specification barrel nickel plating to any desired deposit from .0002" to .0010" at speeds four to six times faster than a cold solution.
Seymour Barrel Nickel Brightener solutions are also available for cold plating baths where decorative deposits of about .0001" maximum are required.
Simple to maintain and easy to control, Seymour brighteners permit chromium plating without prior buffing or wiping.
THE SEYMOUR MANUFACTURING CO.
SEYMOUR, CONN.
Nonferrous Alloys Since 1878

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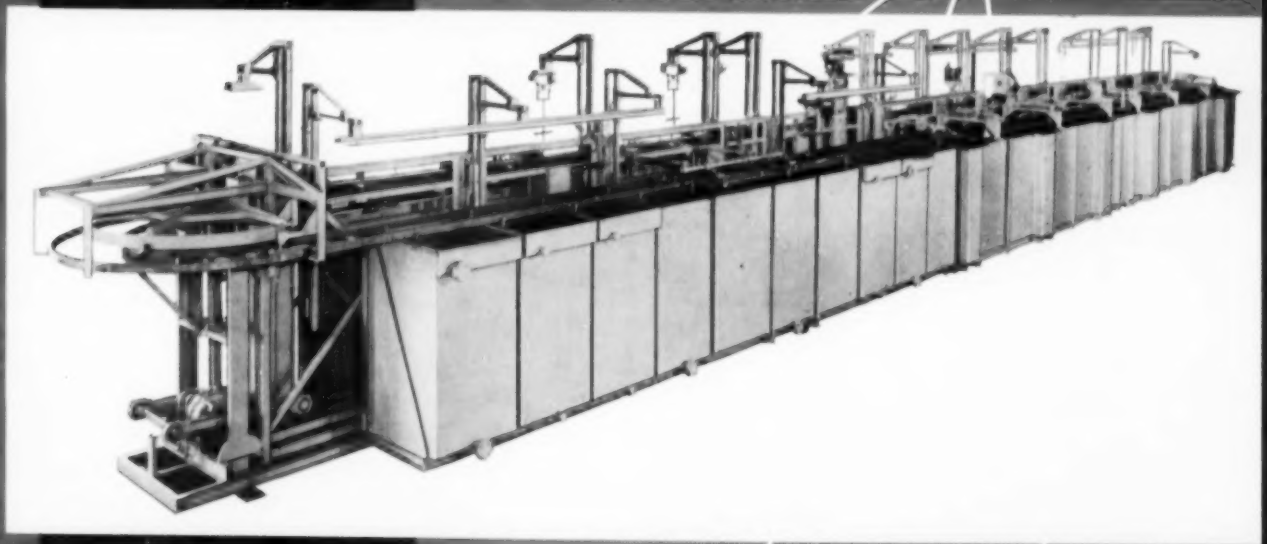
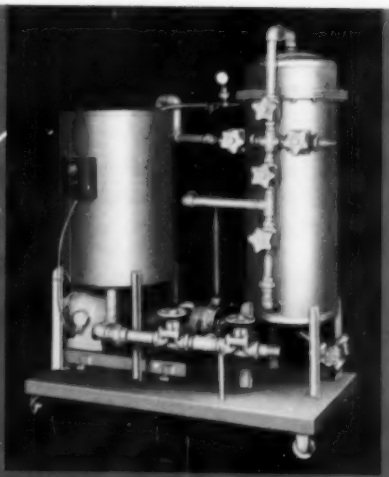
BULLETIN 455

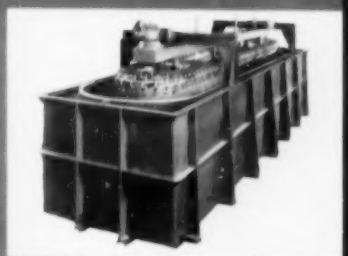
tomorrow's equipment today

WAGNER BROTHERS
automatic plating equipment and supplies





RECTIFIERS
AUTOMATICS
SEMI-AUTOMATICS
FILTERS
TANKS & LININGS
ANODES
WASTE TREATMENT SYSTEMS

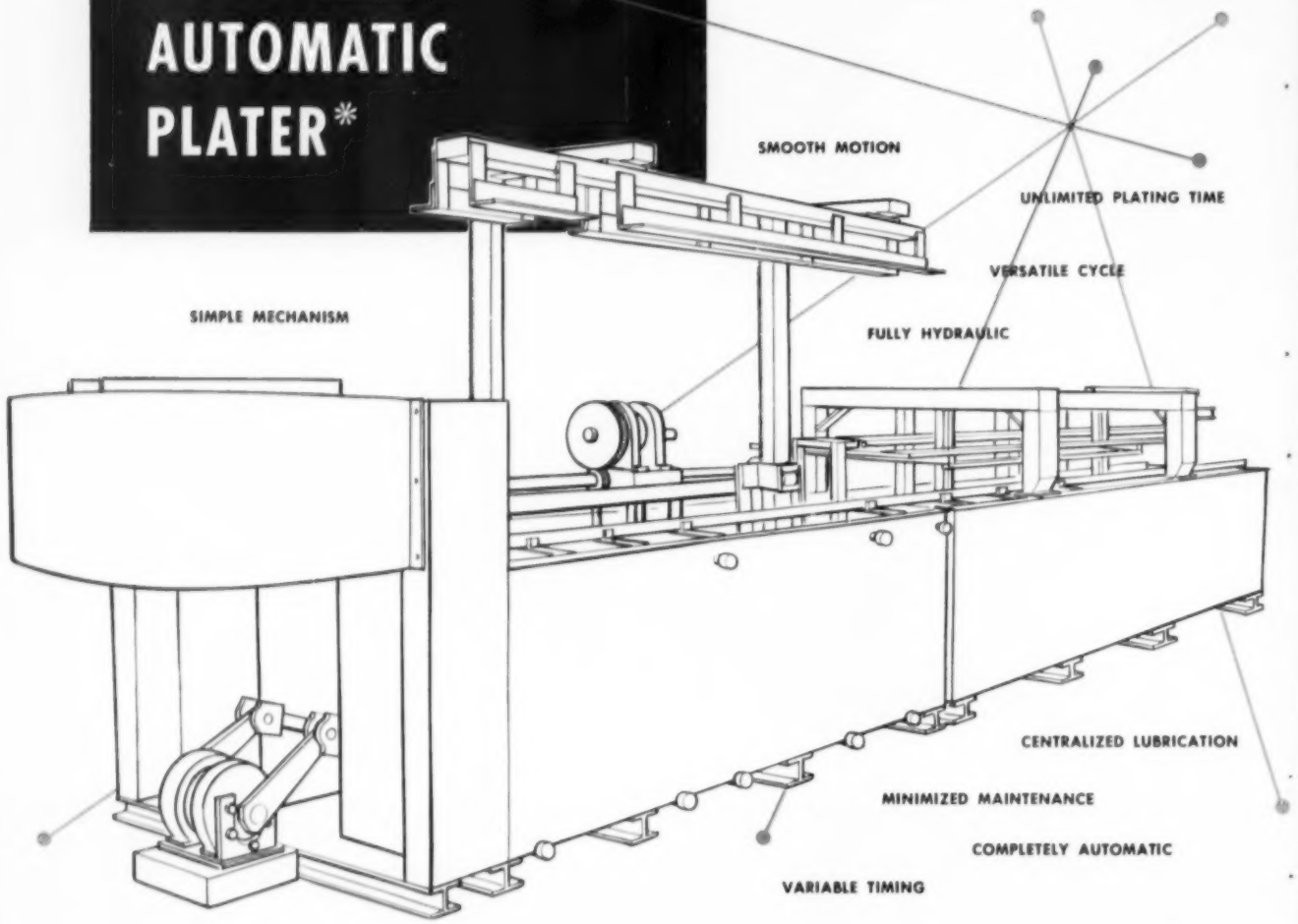


400 MIDLAND AVE. • DETROIT 3, MICHIGAN

Chicago • Rochester • Cleveland • Cincinnati • Indianapolis • New York

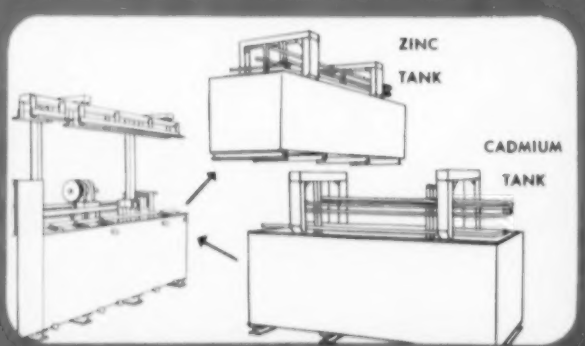
WAGNER BROTHERS *NEW* STANDARD FULLY AUTOMATIC PLATER*

revolutionary concept in plating automation now available to job platers in a standardized model



Automatic operation benefits you by increased production capacity, lowered unit cost and improved quality control—it's faster, cheaper, better.

The *new* Wagner Brothers Standard Automatic now offers you, for the first time, an automatic plater with these *exclusive* advantages:



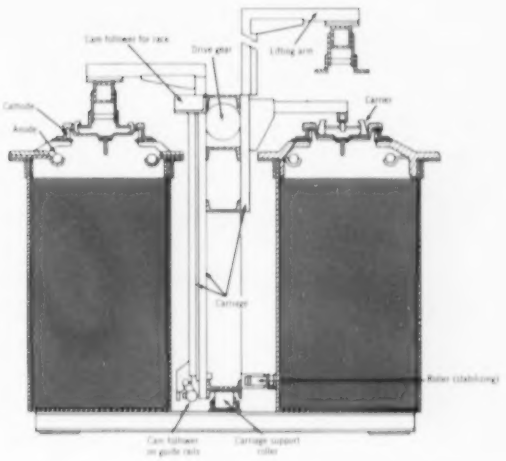
REPLACEABLE PLATING TANK

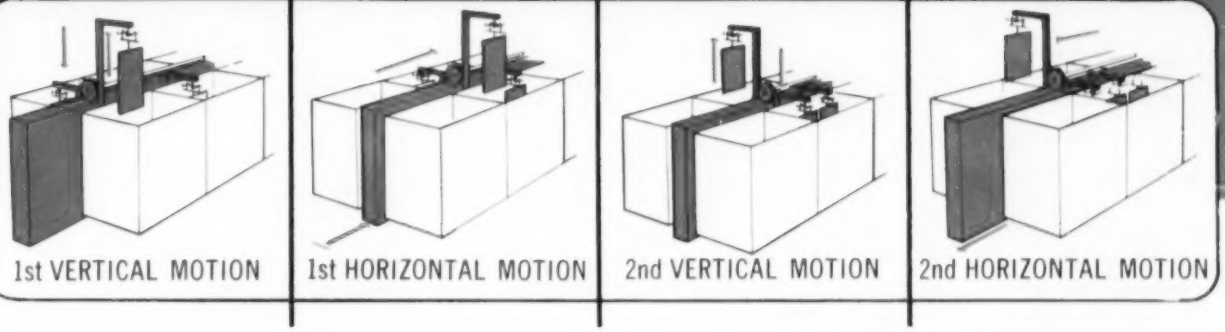
You can *change from plating zinc to cadmium in minutes;* the usual time-consuming tank cleaning operations are unnecessary. Just imagine what you'll save in time and materials. Since all conveying rails are built into the plating tank, you simply pull one tank aside and replace it with a spare. This feature gives you all the versatility of having two automatics.

*PATENTS PENDING

SIMPLE TRANSFER MECHANISM

Unique vertical transfer and return type work conveying design efficiently minimizes number of parts, subsequently reduces chances of breakdown. There are no elevating superstructures, transfer cams, chains and sprockets or hydraulic cylinders over tanks. The carriage is motivated by a hydromotor mounted at the base of the machine, fitted with a crank and link to translate the simple harmonic motion of the motor shaft to the in-line reciprocating action of the carriage.





HOW IT OPERATES — All transfer and conveying mechanism is mounted on a reciprocating carriage located between the two rows of tanks. Two basic motions are used: one forward and reverse horizontal motion of the carriage and a raising and lowering movement of lifting arms attached to the carriage. Plating racks are attached to work carriers at the loading station. When the machine is started, the lifting arms pick up work carriers on one side of the machine, carry them forward to the next station where they are lowered and disengaged. This sequence is simultaneously produced in reverse on the opposite side so that the effect is a balanced work load which requires only low hydraulic pressures.

ELECTRICALLY ISOLATED — The plating tank is a separate unit, electrically isolated from the rest of the mechanism to eliminate possibility of stray currents.

3 POINT CONTACT — The work carrier is designed to give 3 point contact at all times. Constant wiping action on electrified rails keeps contacts clean, assures constant, dependable current flow.

VERSATILE CYCLE — You can have as many as seven stations in both the pre- and post-plating cycle. Tanks are sectionalized at the factory to your particular needs.

SMOOTH PARTS TRANSFER — Our hydromotor power principle *eases* parts through their cycle without jarring them loose from carriers into the tanks.

MINIMIZED MAINTENANCE — All these features vastly minimize maintenance needs: fewer moving parts to wear, no vibration or backlash in automation, no hydraulic cylinders over tanks to contaminate solutions, centralized lubrication, built-in overload protection, working parts easily reached without disassembly, uses only low hydraulic pressures because of balanced work load, and many more.

SIMPLE INSTALLATION — Unit is delivered to your plant intact or in two completely assembled sections. You avoid costly installation.

WRITE NOW FOR COMPLETE TECHNICAL DESCRIPTION, QUOTATION

WAGNER BROTHERS, INC.

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KROME-ON*

mist-inhibiting
chromium addition agent

really increases *throwing power!*

Industry has spent thousands of dollars and years of research looking for ways to increase throwing power of chromium plating baths—all without significant success. And now, like a bolt from the blue, comes Wagner Brothers' new KROME-ON liquid addition agent which not only gives you throwing power which has *doubled* production and *eliminated* rejects on the plating line, but gives you these other advantages *gratis:*

- Vastly reduced chromic acid waste due to decreased spray, drag-out and flue loss.
- Simplified waste disposal.
- Safe working conditions at reduced ventilating cost.

Unbelieveable? Well, hear this documented statement, just one of many in our files!

"We were processing 20 parts per rack through our copper-nickel cycle. We had always averaged 10 rejects at the chrome station, although we could plate 10 parts per rack without rejects, a loss of 50% in production. Then we made KROME-ON additions to the chrome bath. The throwing power was so improved, we consistently ran the full rack of 20 parts without a reject. We never had such performance with any other additive and we saved the cost of mist-inhibitors usually required." (Name of company supplied upon request.)

KROME-ON will not alter the sulfate radical content of your chrome bath, thus will not change the chosen ratio. An excess of KROME-ON will not impair operating characteristics.

Let our service representative demonstrate the obvious advantages of new KROME-ON. Technical data, prices available upon request. *Call or write now!*

*Pats. Pending

WAGNER BROTHERS, INC.

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LITHO IN U.S.A.

Please forward full details on the new KROME-ON mist-inhibiting addition agent to:

Name _____ Title _____

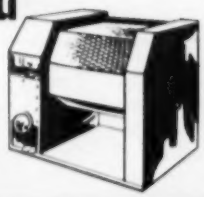
Company _____

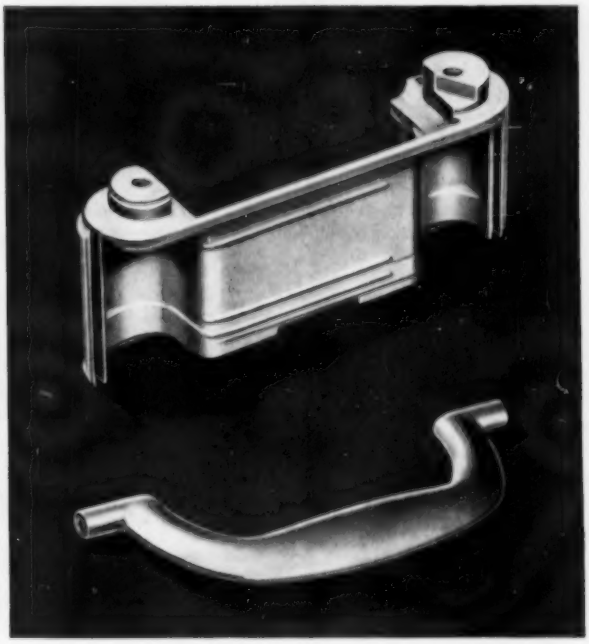
Address _____

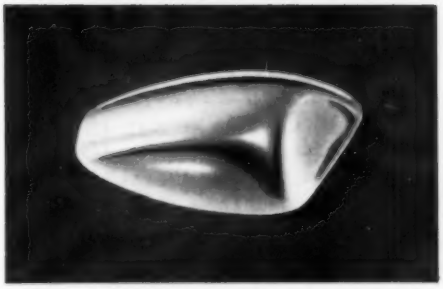
City _____ Zone _____ State _____

PRODUCT OF
3M
RESEARCH

New HONITE "Micro Cut" Compound gives super smooth finishes on zinc and aluminum die castings!







Use HONITE "Micro Cut" Compound for Mirror Finish on Stainless Steel

On stainless, new "Micro Cut" Compound mirror finishes without darkening, preserving the metal's bright natural color. Impingement control prevents scratches and nicks—corner break is generated with NO dimension change.

Yes, now you can put a super smooth finish on zinc or aluminum die castings. New HONITE Brand "Micro Cut" Compound contains a brand-new, superfine, natural abrasive (exclusive with HONITE) which assures a smooth finish on every die casting. And HONITE "Micro Cut" Compound can cut the "extra steps" from your barrel finishing operation, too. You can eliminate extra rinsing . . . extra coloring . . . extra labor!

HERE'S HOW! On zinc or aluminum die castings, HONITE "Micro Cut" Compound gently and quickly polishes out surface imperfections without "skinning" or exposing porosity—*and* reduces impingement or nicking, because it holds the parts firmly in the chip mass during the run. You get a quality surface for quality plating on zinc die castings . . . a super smooth surface on aluminum die castings . . . with no need for extra rinsing or coloring!

Write today for a demonstration in your plant of HONITE "Micro Cut" Compound.

Honite BRAND

MINNESOTA MINING & MFG. CO.
DEPT. FC-105, ST. PAUL 6, MINN.

☐ Yes, I'd like a demonstration of HONITE "Micro Cut" Compound.

☐ Send me free copy of booklet: "Facts and Figures Report on HONITE Barrel Finishing", which contains complete information about HONITE barrel finishing compounds.

Name.....Title.....

Company.....

Address.....

City.....Zone.....State.....

Made in U.S.A. by Minnesota Mining and Mfg. Co. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Avenue, New York City. Makers of "SCOTCH" Brand Pressure-Sensitive Tapes, "SCOTCH" Brand Magnetic Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

WASHINGTON

land. Chemist at National Bureau of Standards since 1941, now serving as an assistant chief of Electrodeposition Section. He has worked mainly on developments of iron electrotypes, electroforming, electropolishing, and chromium plating and gun bores.

He has held all of the offices except Treasurer in the Baltimore Washington Branch and is a member of the American Chemical Society and the Electrochemical Society. He is married and has four children.

His Committee is arranging for all of the scheduled meals at the hotel and is planning the method of handling banquet reservations.

RAYMOND STRICKLEN

Publicity Committee

Born in Baltimore, Maryland in 1916. Baltimore Polytechnic Institute 1933.

Started in Electroplating in 1937 at Revere Copper and Brass, Inc. Foreman Plater at Gilbert Cummins & Company 1942–1944. Served a year in the U. S. Navy and was for a time Sales Representative for a manufacturer of cleaning compounds. Two years with Glenn L. Martin Company. From 1948 to present, a Development Engineer at Allied Research Products, Inc. Completed correspondence course in Electroplating with Dr. C. B. F. Young and International Correspondence Schools course in Chemical Engineering.

Stricklen

Member of Baltimore Washington Branch AES and served terms as Secretary, Treasurer, and President. Member of Electrochemical Society.

His Committee has outlined the Publicity Program for the 43rd Convention, and has started issuing the news releases.

Why it pays to SPIN-DRY plated work—small lacquered parts

Choose from 3 carefully engineered models . . .

1. **Standard Model.** Takes nearly every type of part. Built for long, trouble-free service. J. I. C. and N. E. C. controls also available.

Saves time . . . With the New Holland Kreider Dryer operating at 625 r.p.m. on only ¾ h.p. you can *spin-dry* a basket of parts (1140 cu. ins.) in as little as 35 seconds—no more than 2 minutes.

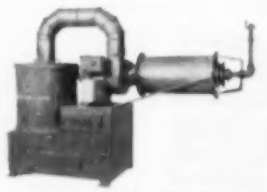
Improves quality . . . With a New Holland Kreider Dryer, high speed centrifugal spin-drying eliminates scarring and marring, assures smooth, evenly dried surfaces, with longer lasting luster . . . fewer "rejects."

Cuts costs . . . What's more, though a New Holland Kreider Dryer occupies less than 6 sq. ft. of floor space, it's a big money saver. Power costs are low, production high—with little or no maintenance over the years. And one man can operate it, easily, efficiently.

See for yourself. Write Department PT1055 today for illustrated 4-page folder.

New Holland Machine Co., New Holland, Pa.

2. **With Auxiliary Steam Heating Unit.** Used for small parts that hold moisture—lacquered parts—or where cold water rinse is used. Shown with J.I.C. control—N.E.C. control also available.



3. **With Auxiliary Gas Heating Unit.** Used for small parts. Caution: Do not use with inflammable materials.

NEW HOLLAND KREIDER DRYER

AES News

NAMF Liaison Post To Glab

Paul Glab, secretary of the Chicago branch, has been named chairman of the AES Liaison Committee to the National Association of Metal Finishers. This announcement was made this month by Clyde Kelly, President of the Society.

Glab

Glab, active in Society and intersociety activities for years, heads a committee which will work closely with the NAMF in matters of mutual concern to the AES and the NAMF. Serving with him is Bruce Warner of the Boston branch.

NORMAN H. MILLER

After a long illness Norman H. Miller of Boyertown, Penna. died on July 25th, 1955. Miller was a charter member of the Allentown-Reading branch. He was a familiar, friendly presence at most American Electroplater's Society Conventions where he served as a delegate on numerous occasions for the Allentown-Reading Branch.

For nearly 3 decades he had charge of the Finishing Dept. at the Boyertown Burial Casket Co. in the community where he resided. Miller's keen and active interest in all society affairs and functions was an inspiration to all of us in the local branch and to the members of the National organization who knew him.

He held various offices in the local branch during the past few years and always did his utmost to carry out those duties to the best of his ability. In the early part of 1955 the Allentown-Reading Branch had started procedure to obtain honorary membership for Miller. We realize that he would have really felt this to be a great honor.

AES Credentials Committee Named

Dr. George P. Swift, AES Past President and Chairman of the Credentials Committee has named the following to serve on the AES Credentials Committee for the fiscal years 1955–56: Franklyn J. MacStoker, Farrand Optical Co. of New York and George P. Wagner, Hy Grade Electro Plating Co. of Newark N. J.

The AES Credentials Committee is responsible for reviewing and approving credentials of delegates and alternates to the annual convention.

Liaison with SPE

Arthur W. Logozzo, a Past President of the AES, was named as Liaison Representative to the Society of Plastics Engineers this month, according to an announcement by **Clyde Kelly,** President of the AES.

Logozzo

Logozzo, presently a member of PLATING's Editorial Board, has been active in the SPE and has served on many of that organization's national committees. He is president of the Nutmeg Chrome Corporation of West Hartford, Conn.

Have you noticed uncle's eyes seem to be watching us only when the foreman is off the floor?

---

cadmax
zimax

New efficiency in plating brighteners

Cadmium and zinc plating need not be dull and frosty. With Cadmax and Zimax, new brighteners distributed exclusively by Federated, cadmium and zinc plated parts are glossy and smooth.

These new Federated brighteners provide maximum throwing power, maximum coverage, maximum allowable current density, maximum brilliance and maximum luster. Zimax brighteners are available in both liquid and powder forms; Cadmax is available in liquid form only.

Ask your nearest Federated distributor to show you what Cadmax and Zimax will do. Or fill in the coupon below and we'll have a Federated sales engineer call on you from the nearest of our 13 plants and 23 sales offices.

Federated Metals

DIVISION OF AMERICAN SMELTING AND REFINING COMPANY
120 BROADWAY, NEW YORK 5, N. Y.
In Canada: Federated Metals Canada, Ltd., Toronto and Montreal

Aluminum, Magnesium, Babbitts, Brass, Bronze, Anodes, Zinc Dust, Die Casting Metals, Lead and Lead Products, Solders, Type Metals

Federated first in the non ferrous field FMD

I want to know more about Cadmax and Zimax, your new cadmium and zinc plating brighteners. Please have a salesman call on me.

Name..... Title.....

Company.....

Street.....

City..... Zone..... State.....

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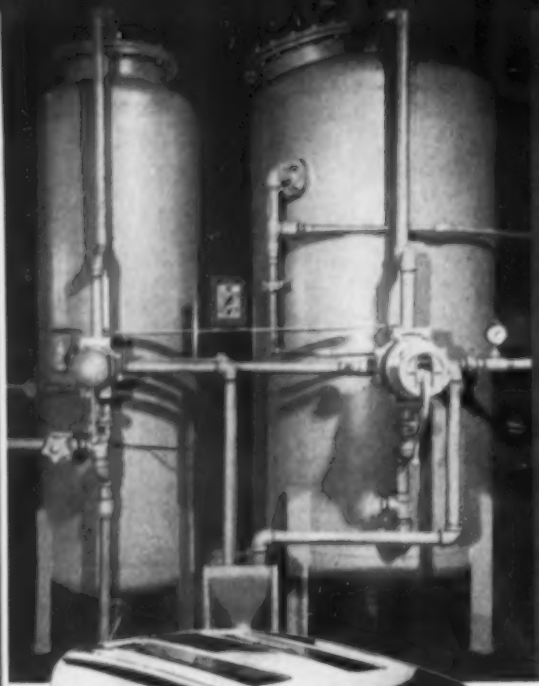
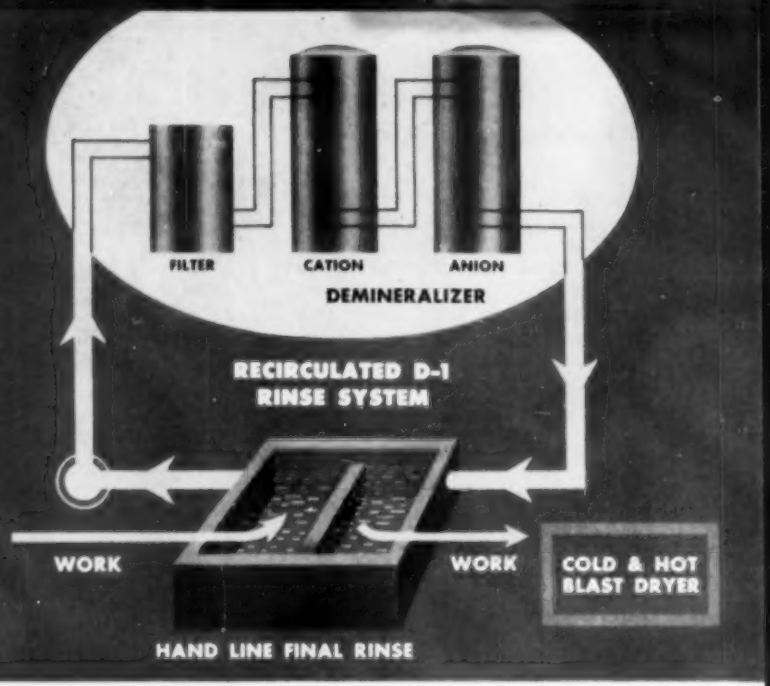




Toastmaster improves finish... lowers production costs with

INDUSTRIAL'S

Rinse Recirculation System

Water with only a few grains of natural solids tastes just fine . . . but if you want top-notch plating, even mineral *traces* will interfere . . . and keep your costs up too.

In looking for a way to make a fine product even better the engineers at the Toastmaster Products Division of McGraw Electric Co. studied their plating process. They consulted Industrial and received a thorough analysis of the water used in their plant at Elgin, Illinois. Industrial recommended an ion exchange system for the final rinse water.

Ion exchange unit greatly reduces final color buffing

The Industrial Recirculation System *continuously* purifies the rinse water. This mineral free water permits a final plate job that reaches Toastmaster's high standard with very little color buffing.

IMPORTANT SAVINGS INCLUDE:

- ★ **Buffing costs, necessary power and material**
- ★ **50,000 gallons of water per week**
- ★ **Cost of purifying chemicals is less than 10% of previous method. Using cation and anion resins resistant to chromic acid, it costs only 2.6¢ to re-purify 1000 gallons of water.**

If your company, like McGraw Electric Co., is interested in quality plating and reduced costs, the best investment you can make, is a talk with Industrial's consultants. Their experience with plating problems can save you thousands of dollars.

Write or call Industrial . . . a short outline of your problem will bring specific data.

Write for 24-page book . . .
"Practical Methods for Treatment of Metal Finishing Wastes"
. . . covers major problems and their solutions, including 6 case histories detailed with costs.

CENTRIFUGAL PUMPS • PRESSURE FILTERS • ION AND HEAT EXCHANGERS • RUBBER LININGS • WASTE TREATING EQUIPMENT

Industrial

INDUSTRIAL
FILTER & PUMP MFG. CO.
5914 Ogden Avenue • Chicago 50, Illinois

BEFORE YOU SAY "WE DON'T NEED IT"
LOOK INTO ALL THE ADVANTAGES OF
ALL THESE ROHCO PRODUCTS!

← Check the Information You Desire, Today!

FOR ZINC PLATING

- ☐ ROHCO 100 BARREL ZINC BRIGHTENER for brilliant deposits, maximum coverage and lowest cost.
- ☐ ROHCO 303 STILL ZINC BRIGHTENER for highest luster zinc, used with or without conversion or bright dips.
- ☐ Perma-Brite BARREL ZINC BRIGHTENER for economical bright zinc plating. Deposits not quite so bluish as ROHCO 100.
- ☐ Perma-Brite STILL ZINC BRIGHTENER outstanding in lowest cost for large volume solutions; stable in the bath, completely soluble —added directly to the tank. The answer to automatic zinc plating. Easily used for conversion or bright dips.
- ☐ ROHCO ZINC PURIFIER to keep baths in tip-top shape.

FOR CADMIUM PLATING

- ☐ ROHCO 20XL (Liquid or Powder) gives brightest cadmium; minimizes cadmium consumption by improving uniformity of deposit.
- ☐ AIRCRAFT BLACK CADMIUM PROCESS for adherent, attractive blackening of cadmium.

FOR CHROMIUM PLATING

- ☐ ROHCO NO-CRO-MIST® the original additive to safeguard worker's health by eliminating chrome fumes, solves ventilating and heating problems; saves chromic acid.
- ☐ CHROMETER—a special hydrometer which gives direct chromic acid content at the bath operating temperature.
- ☐ HULL CELLS AND RECTIFIERS for speedy, positive catalyst control.

FOR ALL PLATING

- ☐ HULL CELL UNITS of lucite, solid-wall porcelain and molded polythene. New Model "WT" or "WT1000" with immersion heater and built-in thermostat; electric Hull Cell Agitator.
- ☐ HANGING HULL CELL is a novel device for making plating tests under production conditions. Indispensable for checking each operation in a plating cycle.
- ☐ HULL CELL ANODES: cast of various metals.
- ☐ HULL CELL CATHODES: zinc plated steel, No. 3 finish; or polished brass with peelable protective coating.
- ☐ SMALL PLATING RECTIFIERS for Hull Cell Tests and experimental plating: Models B267, B500, B1000, B1500 with capacities ranging from 5 to 50 amperes at adequate voltage for all plating.
- ☐ ROHCO CURRENTESTER enables platers to detect and correct the hidden troubles of rectifiers that ordinary meters don't indicate. New Model C-2, compact, attractively priced.
- ☐ ROHCO RINS-AID sheds water; improves drying; prevents staining.

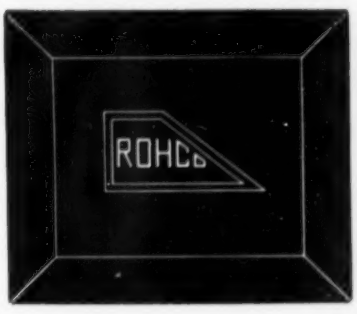
R. O. HULL & COMPANY, Inc.

1302 Parsons Court Rocky River 16, Ohio

Canada: Armalite Company, Ltd.

Toronto 6, Canada

"THE HULL CELL TEST MAKES PLATING BEST"



Branch News

BRIDGEPORT

Application for Readmission

The regularly scheduled business and educational session of the Bridgeport Branch, AES, was held in the main ballroom of the Hotel Barnum on Friday, September 9.

President **Joseph Simon** called the meeting to order at 8:25 P.M. at which time 41 members and guests were present. The Secretary's report was read and accepted. The Treasurer's report was read and accepted.

A transfer slip received from Springfield Branch for **John Ivanits** was not acted upon because transferee was not present with his copy.

Report of Standing Committee:

Sick—No sickness reported. Publicity—Progressing favorably. Projector—In safe hands and in good condition.

Communication to the Branch:

A note of thanks from the bereaved family of **George DeMatteo** for our floral offering.

The Board of Managers were not able to report any activity on their intended investigating of the probability of increasing the dues of the Branch in order to meet the increased costs of operating the Branch. They asked the indulgence of the members and promised a report by the October meeting.

After considerable discussion, the Branch, by secret ballot, voted to instruct the Board of Managers to make proper application to the Executive Committee of the New England Regional for readmission. In the event that the reaction is favorable **Richard C. Barrett** was voted Chairman of the committee to finalize all details and to work with the Regional Committees for due process of same. At 9:15 the meeting was turned over to **Michael Tamas,** our Librarian, who introduced our featured speaker of the evening, **William K. Murray** of Enthone Inc. Bill's talk, with the aid of color slides and a laboratory scale demonstration of a derusting process, was able to hold the keen interest of the audience and was roundly applauded for his efforts at the conclusion of his talk. Refreshments were served and television viewing of the current Friday nite sockeroo was also a part of the evening.

BOB PARKER

BUFFALO

Regional Meeting Chairmen

The Buffalo Branch, AES, held its first meeting of the 1955–56 season in the Markeen Hotel, Friday September 9.

William D. Hart, Past President, presented the charter of the Branch to the new President, **Dr. A. A. Janis,** as token of his office.

C. Gorden Johnson and **Allen Feder** were visitors.

Joseph Ruff reported that the picnic held July 31, at the Kendall Club grounds on Chautauqua Lake was a success with more than 225 attending.

Carl Humes was appointed chairman of the Christmas party to be held at the Markeen Hotel, Friday December 2.

President Janis appointed the following Committee Chairmen for the Empire State Regional Meeting April 14, 1956 to be held at the Statler Hotel in Buffalo. Chairman of educational session, **Frank Rudolph**; Financial—Assistant Treasurers, **James Moneypenny** and **Charles Fotheringham;** Program, **Boris Joffe;** Publicity, **John Martin;** Ladies Chairman, **Mrs. Ruff, Mrs. Hart,** and **Mrs. Martin.**

The following applications were approved by the Board of Managers and were admitted to membership:

Ralph D. Stemmerich, Clarence, N. Y.; **Ralph E. Ludwig,** Youngsville, Pa.; **D. D. Dalrymple,** North Warren, Pa.; **R. M. Spencer,** Youngsville, Pa.; Allen M. Feder, Buffalo, N. Y.; **Paul H. Margulies,** Eggertsville, N. Y.; **Wm. G. McDonald,** Erie, Pa.

H. A. Fudeman was appointed chairman of a committee to revise the Buffalo Branch by-laws.

Frank Rudolph introduced **F. P. Spruance,** American Chemical Paint Co., who spoke on the subject: "Preservation and Paint Bonding of Aluminum."

ERIC G. SAMPSON, JR.
Secretary

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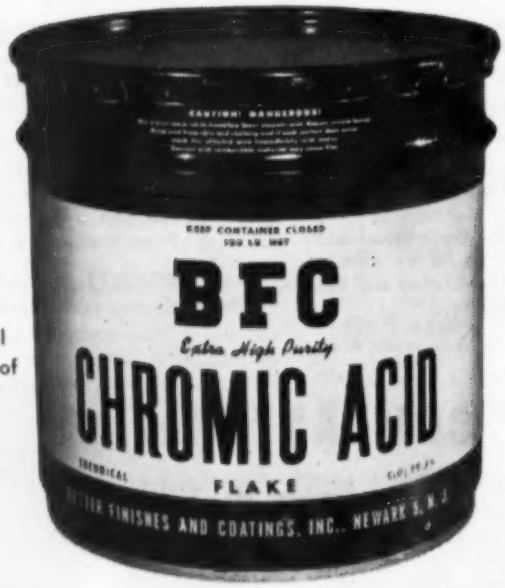

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CHICAGO

Logozzo Starts the Season

The September meeting of the Chicago Branch of the AES found the officers and the members enthusiastic and inspired to new activities after their summer of rest.

The first speaker of the new season was an old fried, **Arthur Logozzo** of the Nutmeg Chrome Corporation in Hartford, Conn. He is a Past President of the AES, has been active in the Society's affairs for nearly thirty years and is a contributor of an annual award for the best paper on Chromium Plating presented to the National Society each year. Aside from the fact that he is an excellent speaker, Logozzo's presentation was of considerable interest. In essence, it was a movie tour through his shop, showing various types of chromium plating jobs as handled in production. His commentaries throughout the film and the film itself pointed up the necessity for good technique, proper equipment and cleanliness to produce high quality hard chromium deposits. Following the presentation, a lively discussion period indicated the interest of the members and their guests (members of the Chicago Electroplaters' Institute).

The September panel of experts was **Walter Warner** of the Kocour Company on "Buffing Compounds" and **Clarence R. Kolzow** of Western Electric Company on "Plating and Organic Finishes." The following questions were brought up and answered by the panel and other branch members:

Q. Why is aluminum which has been buffed prior to anodizing duller than aluminum which has been bright dipped prior to anodizing?

A. Primary causes are surface impurities plus stress in the surface caused by or the result of buffing.

Q. What cleaner should be used to clean zinc plated parts after they have been baked to relieve hydrogen embrittlement?

A. A mild alkali cleaner (dip). This was the consensus of opinion after considerable discussion.

Q. Can parts which have been chromate dipped be baked to relieve hydrogen embrittlement?

A. Baking is not recommended. (Experience has shown that chromate films should not be baked).

Q. How can buffing compound be removed from the heads of screws after final color buffing?

A. A compound with a softer grease or one with a pure tallow base should be used. It is also recommended that parts be handled promptly before the compound has a chance to thoroughly dry out. To remove the compound, it was suggested that parts be soaked in a mixture of carbon tetrachloride and naphtha or soaked in a whale oil soap solution.

Q. What is the best method to relieve oxidized copper and silver, using a buff?

A. The first opinion expressed was that the use of a wet scratch brush and pumice would be more desirable than buffing. It was also suggested that good results could be obtained by the use of a fine greaseless compound. A third suggestion was the use of a nickel-silver scratch brush and soap bark.

At the August Business Meeting, Chicago Branch saluted **Rudy Hazucha** on his FORTY YEARS of active, continuous membership and uninterrupted attendance. Throughout those years he has contributed much to the growth of the Branch and to the success of its affairs. Another old timer and "Old Pot Member," **Hal Gilbertson,** commented on his reaction as he listened to the AES Research Report given by **Dr. J. Serfass** recently. "It made me happy and more proud of the AES than ever. After reading my report to the 1934 Convention, wherein I made the recommendation that research be discontinued for the time being because we did not have enough funds to carry on, President **Van Derau** came to me and said, 'United Chromium has offered to support the research program in full or in part. What would you do?' I said, 'Let's analyze the situation. If we accept this help, we will be criticized because the members would feel that United Chromium would have too much influence on the Society and, if we do not accept, we will be criticized for discontinuing the research. This is what I would do: get together the Research Committee, the Executive Board and the representatives of

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all available supply people and put it up to them'. The meeting was called and the situation explained. Within half an hour $26,000.00 was subscribed to continue the research and all were given the privilege of helping. So you can see why this Research Report gave me such satisfaction."

JEROME KUDERNA
Publicity Chairman

INDIANAPOLIS

Peters on Tank Linings

The first meeting of the Indianapolis Branch was well attended when forty members met on the 7th of September at the Fox Steak House. Guests included **Keith D. Ford** of the Dayton Branch and **Tom O'Brien** of the Chicago Branch. The usual form of business opened the meeting with reports by the Secretary and Treasurer.

The first item of business was the Research Fund and in a motion by **John Hood** and seconded by **Cliff Gough**, $100.00 will be paid to this fund. Motion was carried.

Under new business, discussion followed about organizing a class in electro-plating. **Dr. Abraham Max** was appointed chairman of this and will report at next meeting.

Our annual dinner-dance will be April 28, 1956 at the Indianapolis Athletic Club. **Bert Hawbee** is general chairman.

One new member was voted into the Branch. He is **David H. Bender,** 1220 N. Leland St., Indianapolis, Ind. Dave is the son of **Roman Bender.**

Our next regular meeting will be in Columbus, Ind. **John Holland** is in charge of arrangements along with the other Columbus members.

Plating Staff Photo

Lancaster Branch Meeting on September 9, featured visit by Executive Secretary P. Kovatis (left), and AES Past President Fred Fulforth (right). Branch President Arthur Arsenault (center), enjoys a good laugh with the two Branch guests.

The program for the evening was announced by **Frederick Anderson,** Librarian. **Robert Peters,** Heil Process, Cleveland and also Secretary-Treasurer of the Cleveland Branch was our speaker. He talked on "Tank Linings."

He talked of non-metallic coatings and the following things are to be considered: surface to be covered, construction of materials to be used and whether ceramics, glass, carbon, wood, cement, paint coatings or porcelain is to be used. Factors also to be considered are the availability of the coating and the service of the material, that is, the length of wearing. Peters showed several colored slides of various objects covered with different coatings. In the purchase of corrosion resistant equipment, investigation of the cost angle is very important.

Our president, **Herbert Kennedy,** again thanked our immediate past president for his many helpful suggestions. **Lundberg** acknowledged this.

EDNA ROBBABOUGH
Secretary

MELBOURNE

Two Meetings, Two Speakers

The 97th regular meeting was opened with a picture show on the 27th July and then the following members were elected: **K. D. Barrett, D. W. Donaldson, J. C. Fitzpatrick, I. M. Howman** and **F. J. Sheehan.**

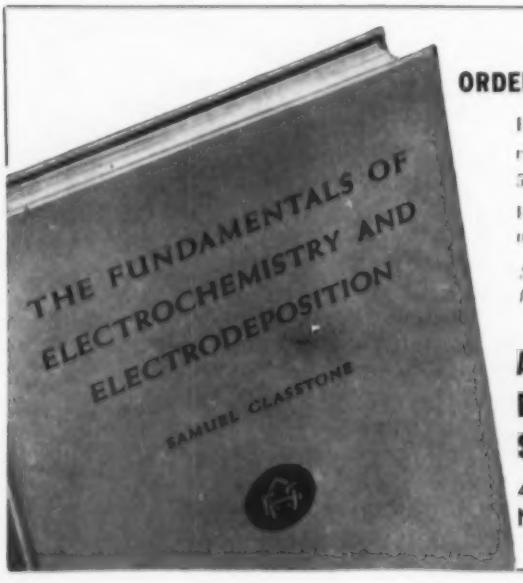
K. Howard of Diecasters Ltd. then gave a most illuminating address on "Plating of Zinc-base Die Castings." Howard listed the alloys normally used for this work and stressed the importance of aluminium in the neutralizing of impurities in the diecast metal which could lead to intergranular corrosion and blistering of electrodeposits.

The actual sequences and formulae of cleaners, rinses, dips and plating solutions and procedures were given in most satisfying detail. The electronic control and working details of the P. R. Cyanide Copper set-up were ably described and amply illustrated with Kodachrome, which also illustrated the Bright Nickel set-up and the various accessories for maintaining the solutions in working condition.

At the conclusion of his address Howard disposed of a large number of questions after which a vote of thanks to Howard was loudly acclaimed.

The 98th regular meeting was opened opened by the President, **Tikotin,** at which 50 members and friends were present, and, after the minutes of the previous meeting had been read and confirmed, members were reminded of the plant visit to Australian Glass Manufacturers on the 1st of September.

An address was given by **C. Swann,** Senior Technical Engineer of Radio Corporation Pty. Ltd., on "Electroplating



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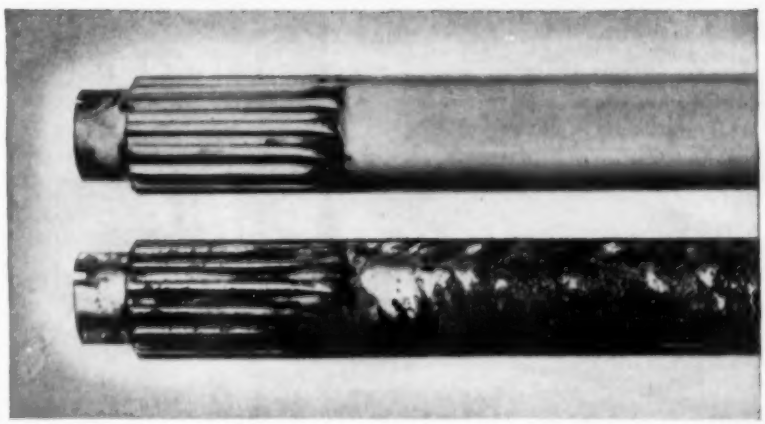
New Crack-Free Chromium Plate gives superior protection



Upper steel shaft, with 0.0005 inch of Crack-Free Chromium, was virtually unaffected after 100-hour salt spray test. Surface of lower shaft with 0.0005 inch of ordinary chromium was completely covered with rust.

A basic need has at last been satisfied. A chromium deposit which gives better protection against corrosion is now obtainable by means of a new process developed by United Chromium.

Unichrome Crack-Free Chromium Plating produces more ductile deposits which are relatively free from internal stress. Thus, deposits do not crack as they are built up to hard plating thicknesses. In this respect they are unlike ordinary chromium which develops cracks, providing corrosives with paths to the underlying metal.

EFFECTIVE PROTECTION DIRECTLY ON STEEL

The photograph above shows that .0005" of Crack-Free Chromium plated directly on the steel prevented rusting of shafts subjected to 100 hours of salt spray, while the same thickness of ordinary chromium failed completely.

In other corrosion tests, parts plated with .0003" of Crack-Free Chromium were as good as new after a full year at 100% relative humidity and 110°F whereas parts with ordinary chromium were entirely covered with rust in days.

For many decorative applications, Unichrome Crack-Free Chromium can be plated directly on steel or zinc base die castings, eliminating need for scarce nickel.

OTHER BENEFICIAL PROPERTIES

Crack-Free Chromium deposits are hard (500 to 700 Knoop), have a low coefficient of friction, and a non-galling, non-seizing surface. The plate has superior ductility and resistance to thermal shock. Unusual leveling action is provided by the solution.

Its grayish, matte finish needs buffing for high luster, but this is done as readily as buffing dull nickel. Attractive two-tone effects can be produced by buffing some areas, leaving others as plated.

Unichrome Crack-Free Chromium has already proved its advantages for hard chromium plating and certain decorative applications in successful commercial operations. Bulletin CFC-1 gives more details. Send for your copy.

Structurally perfect finish from stress-free chromium

Differences in the structure of ordinary chromium and Crack-Free Chromium deposits are shown by the photomicrographs below.

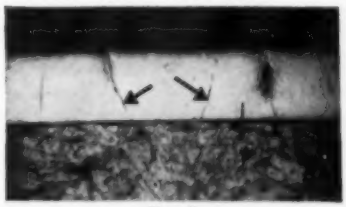


Fig. 1

Fig. 2

Figure 1 shows a cross section of etched ordinary chromium .00125" thick, with part of its network of cracks. Note that some cracks extend through the deposit to the base metal, providing an unimpeded path for corrosives.

Figure 2 shows a section of etched Crack-Free Chromium also .00125" thick. Note the complete absence of cracks.

• • •

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reproduction and Swann then illustrated with an actual recording just how the stampers are prepared. After a short break for questions Major discussed the principles of margin control in recording and reproduction and actual recordings were played through on high fidelity equipment to illustrate his points.

A delightful evening concluded with a vote of thanks to the speakers.

B. Raburn
Secretary-Treasurer

PITTSBURGH

First Meeting; Dr. Hoak on Wastes

Pittsburgh inaugurated the new season with its first meeting at the Sherwyn Hotel's Avalon Room, September 7. The meeting was preceded by a very fine dinner put on by the hotel's new caterer.

At the beginning of the short business meeting we were pleased to welcome a new member into our Branch, **Robert S. Vaupel,** two transfers, **R. M. Burford** from Buffalo and **Frank W. Mountain** of Philadelphia, and accept the applications of two prospective members, **Earl Johnson** and **Sirwell E. Johnson.** We were hosts to five guests for the evening. It was announced that during the drawing for the monthly door prize a second name would be drawn, but the name would not be announced until the dinner preceding the October meeting and if he was present he would receive the meal compliments of the Branch. This idea has been initiated to stimulate attendance at monthly dinners.

After the customary committee reports the meeting was turned over to Librarian **Jim Crain.** He introduced the speaker for the evening, **Dr. Richard D. Hoak** of Mellon Institute of Industrial Research who directs the Water Pollution Abatement Fellowship sponsored by the American Iron & Steel Institute. The subject of his talk was "Plating Wastes and Stream Pollution Control." Dr. Hoak surveyed our water sources, rate of use, types of uses and potential promising methods for increasing, extending or recovery of water. He pointed out that stream pollution is a matter of education, finance and intelligent legislation. Education is the most important since most stream pollution is due to an ignorance of the potential dangers involved.

During the brief pause for refreshments Dr. Hoak drew the name for the door prize and the free dinner. **Herb Schram** was the lucky winner of a beautiful brass barometer presented by Frank Mountain of Hanson-Van Winkle-Munning Co. After a brief intermission for refreshments and a lively discussion period on the part plating room wastes play in stream pollution the meeting was concluded.

Herb Schram
Secretary

SOUTHEASTERN

Ladies Night Dinner Dance

Our ladies night given on August 20, proved very successful. It was attended by 42 persons and a good time was had by all. After a very good supper there was dancing and refreshments. The following suppliers furnished door prizes for the ladies: Udylite Corp., Detroit; Davies Supply & Mfg. Co., St. Louis; Federated Metal, Birmingham; Nickel & Co., Atlanta; Revere Copper & Brass; MacDermid; Parker Rust Proof; Kelite; Southern Lead Burning Co.; Triangle Chemical Co., and several others. The refreshments were served through the courtesy of Udylite Corp., Detroit, Mich. Many thanks **Dick** and **Clem.**

The first regular meeting of the fall season was held on Friday evening September 9, at the Belmont Steak House, Atlanta, Ga. After our usual steak supper, the meeting was called to order at 8:30 with 21 members and guests present, **Clyde Stovall** presiding. Seven applications for membership were read and approved: **James W. Morgan,** Nekum Record Stampers" and he in turn introduced **Major** from the same company to describe the latest trends in high fidelity Products; **H. M. Bone,** F. H. Ross Co.; **R. A. Elliott,** Behr Manning Co.; **F. E. Hundley,** Behr Manning Co.; **Chas. H. Hardman,** Minnesota Mining; **Robt. H. Pasley,** Rushton Co., and **Earl F. Hewes.**

Under new business and after some discussion it was voted to hold a three-day educational session during the month of February, 1956, the exact date to be announced later. **Chas. I. Lewis,** our Librarian has done a very good job of secur-

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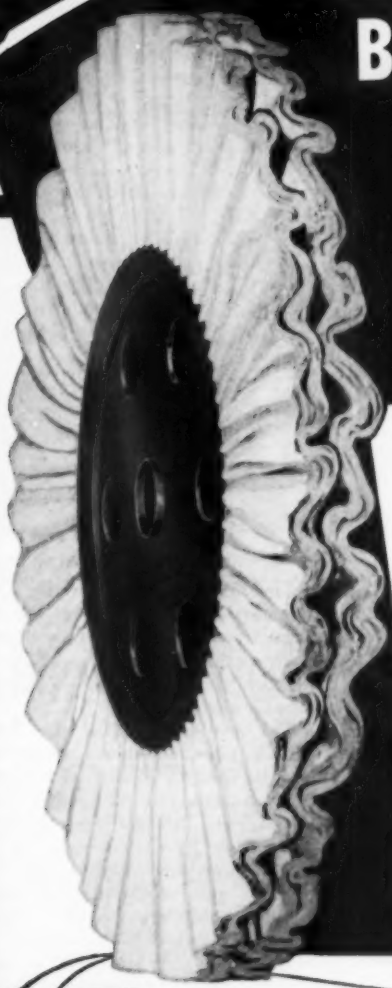

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Branch News

ing speakers for the occasion. In fact, he, **Dick Russell,** and **Chas. L. Anger,** make up our only committee at present. Full support was pledged by our entire membership and we feel sure we will have something well worth while.

Robert Probert was elected assistant secretary to work with **Bill Weymouth,** due to Weymouth not being able to attend the meetings every month since moving to North Carolina.

Our speaker was **Dick Elliott,** of Behr Manning Co. His topic was "New Concepts in Polishing." He not only gave a very interesting talk, but the pictures he showed were most interesting and were enjoyed by all in attendance. We shall call on him again in the future. The meeting adjourned at 10:30.

W. T. Weymouth
Secretary-Treasurer

TORONTO

Fishing, Dancing and Phosphate Coatings

The first fall dinner-meeting of the Toronto Branch was held at the Royal York Hotel. Thirty-eight members sat down to dinner at 6:30 P.M. Fifty-seven members attended the business and educational sessions.

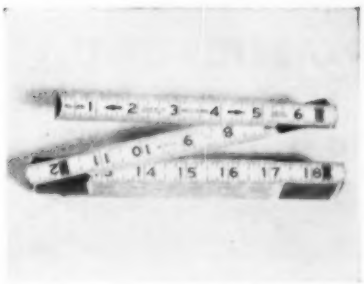
The new President of the Toronto Branch, **John McRoberts,** conducted the business session. Minutes of the last executive and general meetings were read and passed. The Treasurer's report was read and passed. Fourteen new members were accepted into the Society, and two former members were reinstated. **Ted Blandy,** our delegate to the Cleveland Convention, presented his report to the members. Two coming events were announced; the annual week-end fishing stag party at Sturgeon Lake and the annual Electroplaters' Dance to be held at the Club Kingsway, Friday, November 25.

The speaker of the evening was **Bert Palm** of the International Rustproof Corporation of Cleveland. In his talk, entitled "Progress Report of Phosphate Coatings," Palm covered all the various types of phosphate coatings from the original iron phosphate coating to the latest micro crystalline type of zinc phosphate coating which does a faster, more economical, and much better job than any of the several previous types. It is also essentially sludgeless and is the simplest of all treatments to use and to control. The talk was illustrated with slides. A thirty minute question period followed the talk.

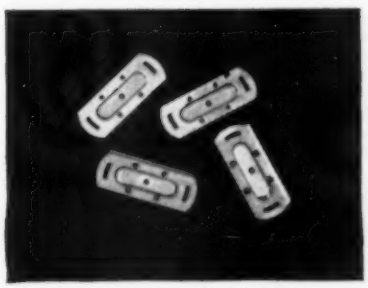
John G. Smith
Librarian

Better luster, savings in time and money are reported by Lufkin Rule Co. as a result of switching to BURNEK 22. Above, barrel is emptied after burnishing operation. Lufkin also uses Wyandotte 444-C, brush-on paint stripper, to salvage steel tape.

How to get brilliant luster at lowest cost



Here is a typical rule which has brass spring joints — made at Lufkin Rule Co.



These are the spring joints which are used on the rule pictured above. Note luster.

Use Wyandotte's Burnek 22, says Lufkin Rule Co., Saginaw, Mich. Here's why:

A continuous search. The Lufkin Rule Company burnishes all brass spring joints on its rulers before their final assembly. In a continuous effort to improve the results of the finishing operation, the company had tried a wide range of burnishing compounds, including soap chips, but without sufficient success to meet their standard of quality. Recently they switched to Wyandotte's BURNEK 22.

Change for the better. "BURNEK 22 gives us better luster than we've been able to get with any other product," says Divisional Superintendent J. H. Farmer. "And it dissolves completely . . . faster. Rinsability? Excellent! It's easy to get really clean parts with BURNEK 22."

Burnishing costs have been substantially cut at Lufkin Rule because, they report, BURNEK 22's easy rinsing and solubility have saved time and money. They use less water for rinsing. And a little BURNEK 22 goes a long way!

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Hartford: R. F. Doyle, A. M. Graneese, R. E. Murphy

Lancaster: C. Willis

Melbourne: K. D. Barrett, D. W. Donaldson, J. C. Fitzpatrick, I. M. Howman, F. J. Sheehan

Newark: E. Earle, J. P. Muscarella, Jr., H. Tilton

St. Joseph Valley: H. E. Sherk

St. Louis: H. P. Materne, Jr.

Southeastern: M. Courvoisier

Sydney: H. Bruce, B. Smith, R. J. Smith

Syracuse: E. H. Huck, R. E. Moore

Member-at-Large: S. Granberger, Stockholm, Sweden; F. A. Palma, Mexico, D. F.; P. J. Rich, Monrovia, California

REINSTATEMENT

Melbourne: R. H. Keller, G. A. Noy, I. Perdrix, J. Reeves, A. T. Sharp

Newark: J. R. Relick

St. Joseph Valley: L. N. Davies

Member-at-Large: J. Riley, Watford, England; A. S. Santiago, Bangalore, India

TRANSFERS

Buffalo: R. D. Taylor, to Syracuse

Lancaster: J. H. Shockcor, from New Haven; G. Skelly, to Columbus

Newark: P. A. Weidle, from Cleveland

New York: H. Bandes, to Member-at-Large; W. R. Phillips, to Member-at-Large

St. Joseph Valley: L. N. Davies, to Waterbury

Syracuse: R. D. Taylor, from Buffalo

RESIGNATIONS

Detroit: A. M. Everit, H. B. Hammond, E. V. Ivanso, A. Nicholls, R. Phillips

Hartford: H. B. Wilson

Lancaster: W. H. Yarnall

Philadelphia: J. G. Gray, G. C. Mountz, J. F. Washko

Saginaw Valley: E. D. Wilson

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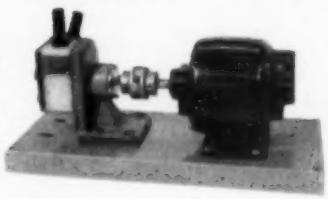

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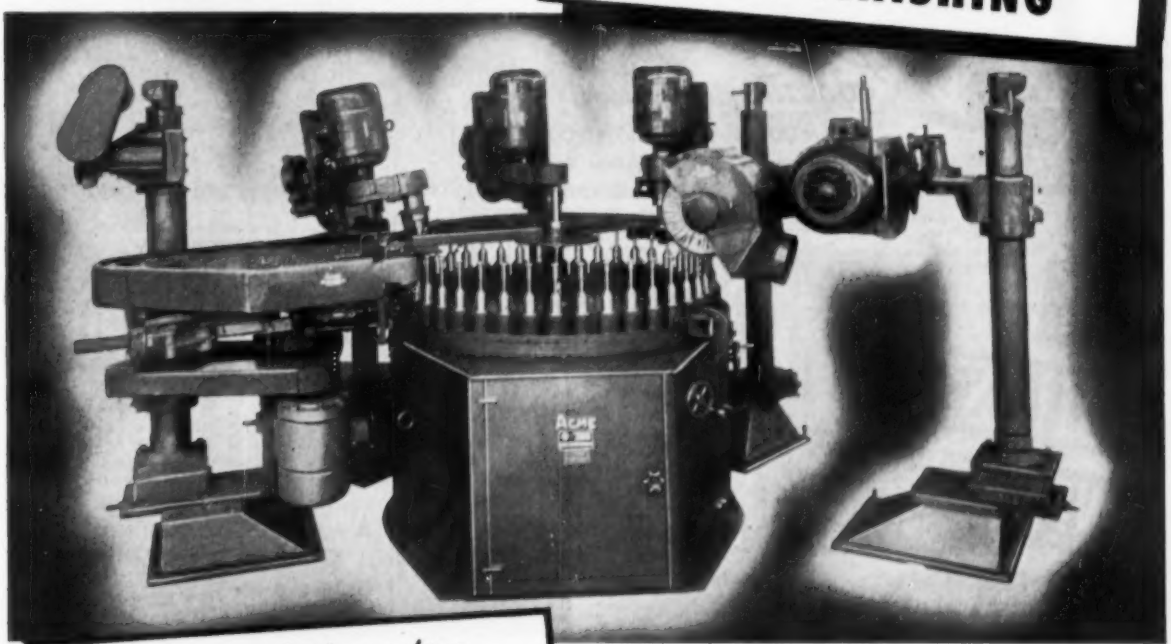

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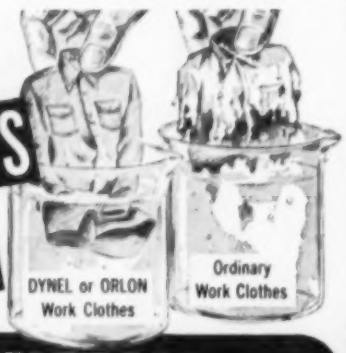

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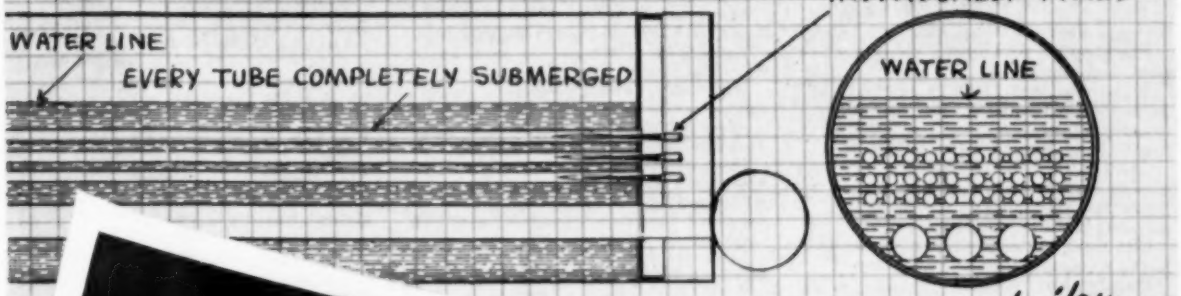

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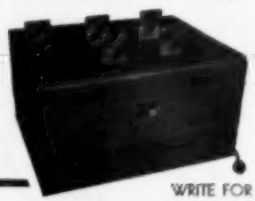

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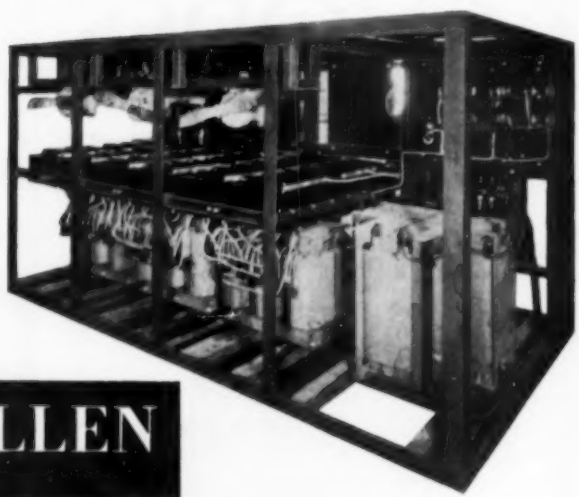

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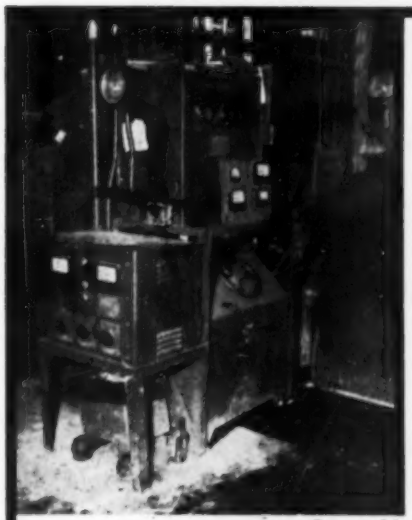

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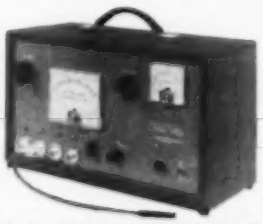

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SECRETARIES AND MEETINGS

ADELAIDE meets second Wednesday of each month at 7:30 P.M. at the University of Adelaide, North Terrace, Adelaide. Secretary-treasurer, R. J. Down, Room 30, 17 Currie Street, Adelaide, S. A., Australia.

ALLENTOWN-READING meets third Wednesday of each month at 7:00 P.M. in Scotty's Anchorage, Second and Main Streets, Emmaus, Pa. Secretary-treasurer, Edgar H. Iobst, Jr., 163 Main Street, Emmaus, Pa. Research finance committee chairman, Lee C. Wotring, 526 N. St. Elmo Street, Allentown, Pa.

BALTIMORE-WASHINGTON meets second Tuesday of each month with meetings in Baltimore at the Engineers' Club and in Washington, D. C., at the National Bureau of Standards. Secretary, Carl H. Thiede, 8426 Piney Branch Road, Silver Springs, Md.

BOSTON meets first Thursday of each month in Hotel Statler. Secretary, Dr. George P. Swift, 53 Galen Street, Watertown 72, Mass. Research finance committee chairman, Louis V. Gagnon, 53 High Street, Natick, Mass.

BRIDGEPORT meets second Friday of each month in Barnum Hotel. Secretary-treasurer, Robert G. Parker, 25 Beverly Road, Bridgeport 58, Conn.

BUFFALO meets first Friday of each month in Markeen Hotel. Secretary, E. G. Sampson, Jr., 43 W. Main Street, Falconer, N. Y. Treasurer, R. E. Campbell, 238 Sprague Street, Jamestown, N. Y. Research finance committee chairman to be appointed.

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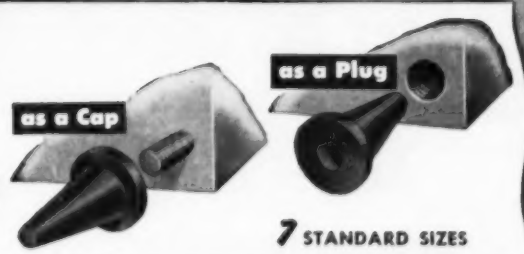

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educational session at 8 P.M. Secretary, Charles Schenk, 1765 Lenox Road, Schenectady, N. Y. Treasurer, John Green, R. D. 1, Thatcher Park Road, Voorheesville, N. Y. Research finance committee chairman, Chester J. Klimek, 16 Southern Avenue, Pittsfield, Mass.

CENTRAL MICHIGAN meets second Tuesday of each month at 7:00 P.M., alternating between Meadow Lark Inn in Jackson and Porter Hotel in Lansing. Secretary-treasurer, E. J. Bosca, 411 Third Street, Jackson, Mich. Research finance committee chairman, Dr. F. Gurnham, Dept. of Chemical Engineering, Michigan State College, E. Lansing, Mich.

CHICAGO meets second Friday of each month at 8 P.M. at Western Society of Engineers, 84 E. Randolph Street. Secretary-treasurer, Paul Glab, 882 N. Paulina Street, Chicago 22, Ill. Research finance committee chairman, Charles Geldzahler, c/o Platers' Technical Service, Inc., 509 S. Wabash Avenue, Chicago 9, Ill.

CINCINNATI meets fourth Wednesday of each month at 6:30 P.M. in Engineering Society Headquarters, East McMillan Street and Woodburn Avenue. Secretary, R. K. Evans, 8484 Wicklow, Cincinnati 36, Ohio. Treasurer, G. T. Speers, 1203 Fifth Avenue, Dayton, Ky. Research finance committee chairman, W. Wilson Loveless, 1350 Arlington Street, Cincinnati 25, Ohio.

CLEVELAND meets first Friday of each month in Hotel Carter at 8 P.M. Secretary-treasurer, R. I. Peters, 12901 Elmwood Avenue, Cleveland, Ohio.

COLUMBUS meets first Friday of each month at 8 P.M. in Battelle Memorial Institute Auditorium. Secretary, Michael Farr, 1735 Franklin Avenue, Columbus 5, Ohio. Research finance committee chairman, to be appointed.

DALLAS-FORT WORTH meets third Wednesday of each month at 6:30 P.M. in Lennox Hotel, Grand Prairie, Texas, half-way between Fort Worth and Dallas. Secretary-treasurer, research finance committee chairman, A. C. Fricke, 212 Julien Street, Dallas 3, Texas.

DAYTON meets third Wednesday of each month in the Biltmore. Secretary, Richard M. Clinehens, 33 W. Market Street, Germantown, Ohio. Research finance committee chairman to be appointed.

DETROIT meets first Friday of each month in Hotel Statler at 8 P.M. Secretary-treasurer, Edward J. Kubis, Wyandotte Chemicals Corp., Wyandotte, Mich. Research finance committee chairman, R. J. Racine, Wyandotte Chemicals Corp., Wyandotte, Mich.

GRAND RAPIDS meets second Friday of each month at Fingers Restaurant at 7 P.M. for dinner, educational session at 8:15 P.M. Secretary, Don Smith, 1825 Martin, Grand Rapids, Mich. Treasurer, P. Norton, 1119 Orchard, S. E., Grand Rapids, Mich. Research finance committee chairman, R. O. Watson, 3045 Kalamazoo, S. E., Grand Rapids, Mich.

HAMILTON meets third Friday of each month, 8 P.M. at Fishers Hotel, Hamilton, Ontario, Canada. Secretary, N. A. Graham, Stoney Creek, P. O. Hamilton, Ont., Canada. Research chairman, W. G. Finlay, 7 Hill Street, Hamilton, Ont., Canada.

HARTFORD meets third Monday of each month in Hotel Bond, Hartford, Conn., at 7:45 P.M. Secretary, Stanley Platoz, 26 Erwin Place, New Britain, Conn. Treasurer, B. Cohen, 185

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HOUSTON meets third Tuesday of each month at 7 P.M. in the Ben Milam Hotel, Houston, Texas. Secretary-treasurer, H. C. Van Wagner, c/o Barada & Page, 2812 Center Street, Houston, Texas. Research finance committee chairman, O. L. Smith, 2903 W. Dallas, Houston, Texas.

INDIANAPOLIS meets first Wednesday of each month at 8 P.M., at Fox Steak House, 1207 E. Washington Street. Secretary, Miss Edna Rohrabaugh, 415 N. 23rd Street, Lafayette, Ind.

JACKSON-LANSING: Name has been changed. See Central Michigan.

KANSAS CITY: Regular meeting date to be announced. Secretary, Olin K. Bock, Turco Products, Inc., 2112 Grand Avenue, Kansas City, Mo.

LANCASTER meets second Friday of each month at 8 P.M. September, December and April meetings are held at Hanover, York and Harrisburg, respectively; all other meetings at the Old Mill Inn, Lancaster, Pa. Secretary-treasurer, Harry A. Saylor, 40 N. Poplar Street, Elizabethtown, Pa. Research finance committee chairman, Harry Hovis, Lincoln Highway, W. Lancaster, Pa.

LOS ANGELES meets second Wednesday of each month at 7 P.M. in Rodger Young Auditorium. Secretary, G. Hetz, 152 Clagstand Drive, Puente, Calif. Research finance committee chairman, Tony Stabile, 417 E. 16th Street, Los Angeles 21, Calif.

LOUISVILLE meets third Thursday of each month at 6:30 P.M., in Kapfhammers Party House, 1506 S. Shelby Street, Louisville, Ky. Secretary-treasurer, Joseph G. Sterling, 6025 Peggy Drive, Louisville 13, Ky. Research finance committee chairman, R. G. Marshall, 3020 Talisman Road, Louisville 5, Ky.

MELBOURNE meets third Thursday of each month at 8 P.M. in Metallurgy Theatre, Melbourne Technical College, 124 Latrobe Street. Honorary secretary-treasurer, B. Reaburn, Park Road, Ringwood, Victoria, Australia.

MILWAUKEE meets first Friday of each month at 8 P.M. in the East Room, Hotel Ambassador. Secretary-treasurer, Clifford A. Peters, 4124 W. Southland Drive, Milwaukee, Wisc. Research finance committee chairman, Les Diveley, 2936 N. 84th Street, Milwaukee 11, Wisc.

MONTREAL meets first Tuesday of each month at 8:30 P.M. ie Mount Royal Hotel. Secretary, Jean Monette, 11700 Notrn Dame Street, E., Montreal, Canada. Research finance committee chairman, P. M. Coady, 216 Westminster Avenue, Montreal West, Montreal, Canada.

NEWARK meets third Friday of each month at 8 P.M. in Hotel Robert Treat. Secretary, Dr. D. G. Foulke, Hanson-Van Winkle-Munning Co., Matawan, N. J. Treasurer, George Wagner, Hy-Grade Electro Plating Co., 35 Fourth Street, Newark, N. J. Research finance committee chairman, John Gumm, 538 Forest St., Kearny, N. J.

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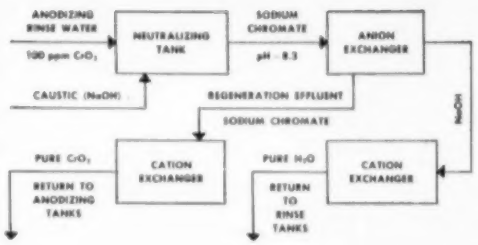

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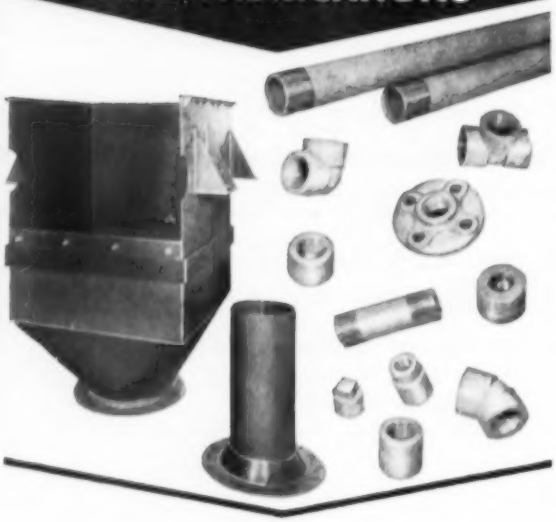

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October 6- 8—Society of Industrial Engineers, 11th Annual Meeting & Design Conference, The Woodner, Washington, D. C.

October 7- 8—American Ceramic Society Refractories, Bedford Springs Hotel, Bedford, Pa.

October 9-13—The Electrochemical Society, Inc., Wm. Penn Hotel, Pittsburgh, Pa.

October 10-12—ASME-ASLE Second Lubrication Conference, Antlers Hotel, Indianapolis, Ind.

October 14-15—American Ceramic Society, Structural Clay Products, Statler Hotel, St. Louis, Mo.

October 17-18—American Ceramic Society, Basic Science, Pennsylvania State University, State College, Pa.

October 17-21—ASM, AWS, AIME Society for Nondestructive Testing, 37th National Metal Exposition & Congress, Convention Hall, Phila., Pa.

October 18-21—NACE South-Central Regional Meetings, Shamrock-Hilton Hotel, Houston, Texas.

October 19-20—ASME-AIME Joint Fuels Conference, Neil House, Columbus, Ohio.

October 24-26—American Standard Association & National Bureau of Standards, Sheraton Park Hotel, Washington, D. C.

October 24-28—American Society of Civil Engineers, Annual Convention, Statler Hotel, New York City.

October 26-28—American Ceramic Society, 8th Pacific Coast Regional Meeting, Olympic Hotel, Seattle, Washington.

October 31-November 3—NACE Northeast Regional Meeting, Hotel Niagara, Niagara Falls, N. Y.

AES

November 19—Annual Educational Session and Banquet, Philadelphia Branch, AES, Hotel Benjamin Franklin, Philadelphia, Pa.

January 28, 1956—Editorial Board Meeting, Conrad Hilton Hotel, Chicago, Ill.

March 10, 1956—Third Annual Tri-State Regional Meeting, AES, Hotel Biltmore, Dayton, Ohio.

June 17-21, 1956—43rd Annual Convention of the American Electroplaters' Society, Hotel Statler, Washington, D. C.

June 17-20, 1957—44th Annual Convention of the American Electroplaters' Society, Sheridan-Mt. Royal Hotel, Montreal, Canada.

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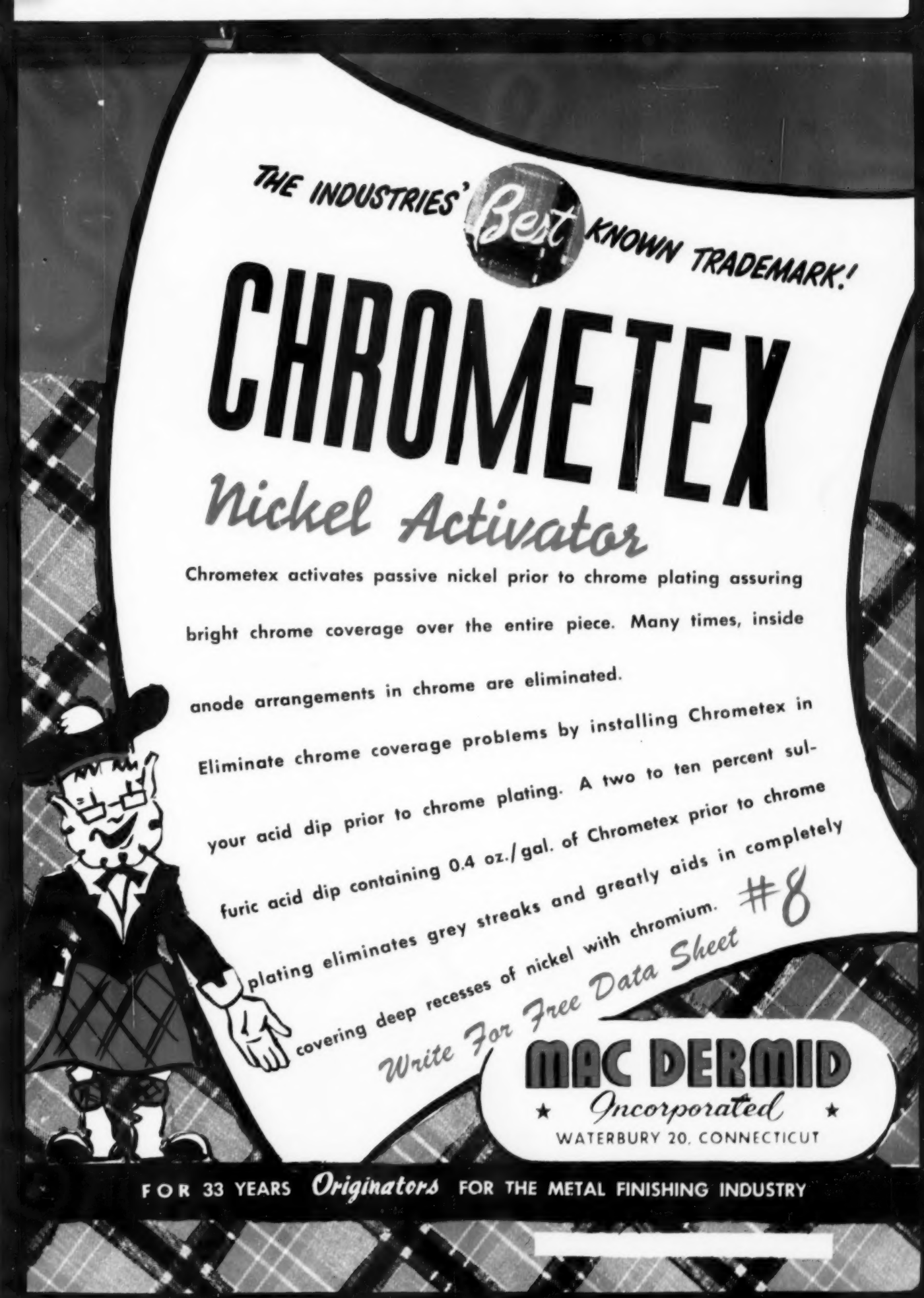

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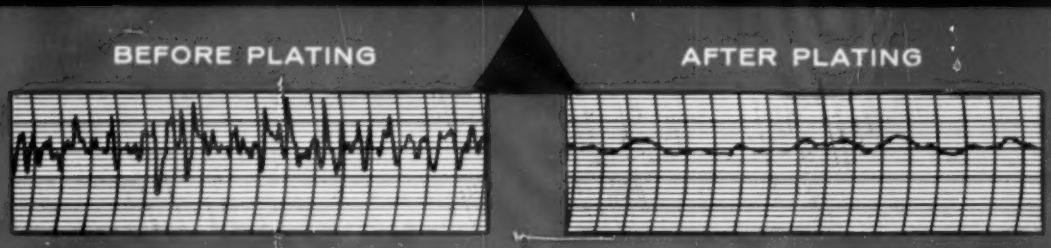

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